6. DELAWARE BAY

(1) This chapter describes Delaware Bay and River, and their navigable tributaries, and includes an explanation of the Traffic Separation Scheme at the entrance to the bay. Major ports covered are Wilmington, Chester, Philadelphia, Camden, and Trenton, with major facilities at Delaware City, Deepwater Point, and Marcus Hook. Also described are Christina River, Salem River, and Schuylkill River, the principal tributaries of Delaware River, and other minor waterways, including Mispillion, Maurice, and Cohansey Rivers.

(2) **Navigation Guidelines for Bay and River Delaware.–**The Coast Guard Captain of the Port, Philadelphia, and the Mariner's Advisory Committee for the Bay and River Delaware jointly recommend the following precautionary measures be taken while transiting in the Delaware Bay and River:

(3) 1. Special precautions should be taken at the time of first major vessel maneuvering. For vessels transiting above the Chesapeake and Delaware Canal, a manned anchor detail should be set (minimum of two qualified personnel on the forecastle at all times). Both anchors should be backed out to the water's edge and ready for letting go.

(4) 2. For a vessel calling at Marcus Hook, whether to anchor or dock, tugs should be alongside and made fast between Lighted Buoy 6B and Buoy 8B on the Bellevue Range.

(5) 3. It is recommended that prior to arrival at the upper end of Liston Range, diesel vessels should change to a lighter fuel for maneuvering purposes.

(6) 4. Upon assuming responsibility for the piloting of a vessel and during the master/pilot exchange of information, it should be established that both steering engines and all main generators are operational. During this exchange of information, any special maneuvering characteristics of the vessel should be discussed.

(7) 5. All steering and main propulsion failures, no matter how extensive or intermittent, are considered hazardous conditions falling under the immediate reporting requirement of **33 CFR 160.215.** (See **160.215,** chapter 2.) When making those reports, the following information should be passed to the Captain of the Port to assist in making a vessel operation movement determinations:

(8) (a) Vessel Name

(9) (b) Flag

(10) (c) Location

(11) (d) On Scene Weather

(12) (e) Visibility

(13) (f) Length

(14) (g) Draft

(15) (h) Cargo

(16) (i) Nature of problem

(17) (j) Known cause

(18) (k) Correction action (Does it address cause fully?)

(19) (l) Pilot's and master's intended course of action/recommendation

(20) (m) Impact on other traffic

(21) **Delaware Bay Approaches and Entrance:**

(22) 1. Vessels arriving at the Delaware Bay entrance are advised to use the Delaware sea-lane or the Five-fathom sea-lane. It is recommended that vessels with a draft exceeding 34 feet use the Delaware sea-lane from the southeast. Towing traffic transiting off the southeastern New Jersey coast is requested to use the inshore traffic sea-lane.

(23) 2. Vessels arriving at the Delaware Bay entrance are advised to contact the voluntary vessel traffic information service through the Delaware Pilot traffic tower on VHF-FM channel 14. Contact should be made upon a vessel's entrance into the appropriate sea-lane. Inbound towing traffic using the inshore sea-lane should contact the tower when off of McCrie Shoal Lighted Gong Buoy 2MS.

(24) 3. Vessels outbound are requested to contact the traffic tower when they are passing the Brown Shoal or Tanker Anchorage Approach Lighted Buoy A if exiting Big Stone Beach anchorage. Additionally, outbound towing traffic should report out of the entrance area while passing Delaware Bay Entrance Channel Lighted Buoy 8.

(25) **Anchorage Recommendations**

(26) 1. Vessels using anchorage #12 off of Kaighns Point, in Philadelphia Harbor are recommended not to exceed 600 feet in length (LOA) or to exceed 30 feet in draft.

(27) 2. Vessels using anchorage #9 off of Mantua Creek, NJ are recommended not to exceed 700 feet in length (LOA) or to exceed 37 feet in draft. It is also recommended that vessels with a LOA less than 350 feet to use the northern ½ mile of the anchorage which is off the Army Corp. of Engineers dock or as close as practical.

(28) 3. Vessels using anchorage #6 off of Wilmington, DE are recommended not to exceed 700 feet in length (LOA) or to exceed 35 feet in draft. It is also recommended that vessels with a LOA less than 350 feet to use the southern end of the anchorage.

(29) 4. Vessels in excess of 700 feet in length (LOA) may anchor at anchorage #7 off of Marcus Hook, PA with a maximum draft of 40 feet. It is also recommended that vessels with a LOA less than 350 feet to use the northern ½ mile of the anchorage which is above lighted buoy 9M or as close as practical.

(30) **Lower River and Bay**

(31) 1. The maximum fresh water draft for river transit from sea to Delair, New Jersey is 40 feet.

(32) 2. All vessels arriving with a fresh water draft in excess of 37 feet are to transit during flood current only.

(33) 3. All vessels over Panamax size beam (106 ft) having a fresh water draft in excess of 35'–06" shall only transit during flood current.

(34) 4. All vessels up to and including Panamax size beam (106 ft) having a fresh water draft of 37 feet and under should arrange their river transit to afford a minimum of three feet clearance in the Marcus Hook area. The clearance should give due consideration to vessel squat, predicted tide, and the wind effect on actual tide.

(35) 5. Vessels outbound from Paulsboro, NJ and above, having a fresh water draft of 37 feet and up to 40 feet should arrange to sail 2 hours after low water. Due to the extended time of transit for these particular deep draft vessels, two (2) river pilots will be arranged for transit to sea.

(36) 6. The maximum salt-water draft for entrance into Delaware Bay and Big Stone Beach anchorage is 55 feet, as per federal regulation. Qualified offshore advisors with portable DGPS units are available upon request from the Pilots' Association for the Bay and River Delaware.

(37) **Vessel Reporting**

(38) It is recommended that vessels report their position and status to the Maritime Exchange over VHF-FM channel 14 in the following situations:

(39) 1. When anchoring.

(40) 2. When getting underway.

(41) 3. When passing through Marcus Hook.

(42) 4. When entering or exiting the C&D canal.

(43) 5. When making fast to the dock.

(44) Tugs operating without a barge are exempt from this recommendation.

(45) **Chesapeake and Delaware Canal**

(46) 1. There is no recommended length limitation for vessels using the C&D canal, however the maximum draft limitation is 33 feet.

(47) 2. Vessels in excess of 760 feet are required to have an operational bow thruster for transit. Vessels in excess of 886 feet are required to have an operational bow and stern thruster for transit. These oversized vessels may use a tug assist instead of a working thruster.

(48) 3. The maximum combined beam of vessels transiting the C&D canal at the same time is 190 feet.

(49) **Upper Delaware River**

(50) The Upper Delaware River pertains to the area of navigation from Delair, New Jersey to the head of navigation on the Delaware River at Trenton, NJ. The Maximum drafts referred to in these advisories pertain to navigation within the Federal maintained 40 feet channel which ends off Newbold Island, NJ.

(51) Vessel Particulars

(52) 1. Any vessel whose beam exceeds 128 feet should transit through the Tacony–Palmyra Bridge during daylight only. Vessels of greater beam and vessels known to be difficult to maneuver should be scheduled on a case by case basis after consultation between the pilots and the operators prior to arrival and departure.

(53) 2. Maximum air draft should not exceed 132 feet.

(54) 3. Vessels of combined beam greater than 185 feet should not meet between the Delair Railroad Bridge and the Burlington Bristol Bridge.

(55) 4. Shipping traffic should avoid meeting above the Burlington Bristol Bridge.

(56) Vessel Draft Inbound

(57) 1. Vessels less than 32'–06" FW may transit on any stage of the tide or current.

(58) 2. Vessels 32'–06" FW or greater up to 35'–00"FW in draft should arrive in Philadelphia harbor no later than 9 hours and 15 minutes, or earlier than 5 hours and 45 minutes from slack flood current at Cape Henlopen.

(59) 3. Vessels 35'–01" FW or greater up to 38'–06" FW in draft should arrive in Philadelphia harbor no later than 8 hours and 15 minutes, or earlier than 5 hours and 45 minutes from slack flood current at Cape Henlopen.

(60) 4. Vessels 32'–06" FW or greater up to 38'–06" FW in draft shall avoid meeting outbound shipping traffic above the Delair Railroad Bridge.

(61) Vessel Draft Outbound

(62) 1. Vessel less than 32'–06" FW may transit on any stage of the tide or current.

(63) 2. Vessels 32'–06" FW or greater up to 38'–06" FW in draft, should sail from terminals above the Delair Railroad Bridge between 1 hour before high water and 3 hours after high water at the dock at which it is sailing.

(64) 3. Vessels 32'–06" FW or greater up to 38'–06" FW in draft, shall avoid meeting inbound shipping traffic above the Delair Railroad Bridge.

(65) Tug Attendance

(66) 1. Vessels in excess of 375 feet should have a tug in attendance during upper river transits.

(67) **Northern Right Whales.–**Endangered northern right whales may occur in approach channels to the Delaware Bay. They are most likely to occur in the area from November through April. (See **northern right whales**, indexed as such, chapter 3.)

(68) **COLREGS Demarcation Lines.**–The lines established for Delaware Bay are described in **80.503,** chapter 2.

(69) **Chart 12214.–Delaware Bay** and Delaware River form the boundary between the State of New Jersey on the east and the States of Delaware and Pennsylvania on the west. The bay is an expansion of the lower part of Delaware River; the arbitrary dividing line, 42 miles above the Delaware Capes, extends from Liston Point, Del., to Hope Creek, N.J. Deep-draft vessels use the Atlantic entrance, which is about 10 miles wide between Cape May on the northeast and Cape Henlopen on the southwest. Vessels with drafts less than 33 feet can enter Delaware River from Chesapeake Bay through the Chesapeake and Delaware Canal, which is described in chapter 7.

(70) **Mileages** shown in this chapter, such as Mile 0.9E and Mile 12W, are the nautical miles above the **Delaware Capes** (or "the Capes"), referring to a line from Cape May Light to the tip of Cape Henlopen. The letters N, S, E, or W, following the numbers, denote by compass points the side of the river where each feature is located.

(71) The approaches to Delaware Bay have few off-lying dangers.

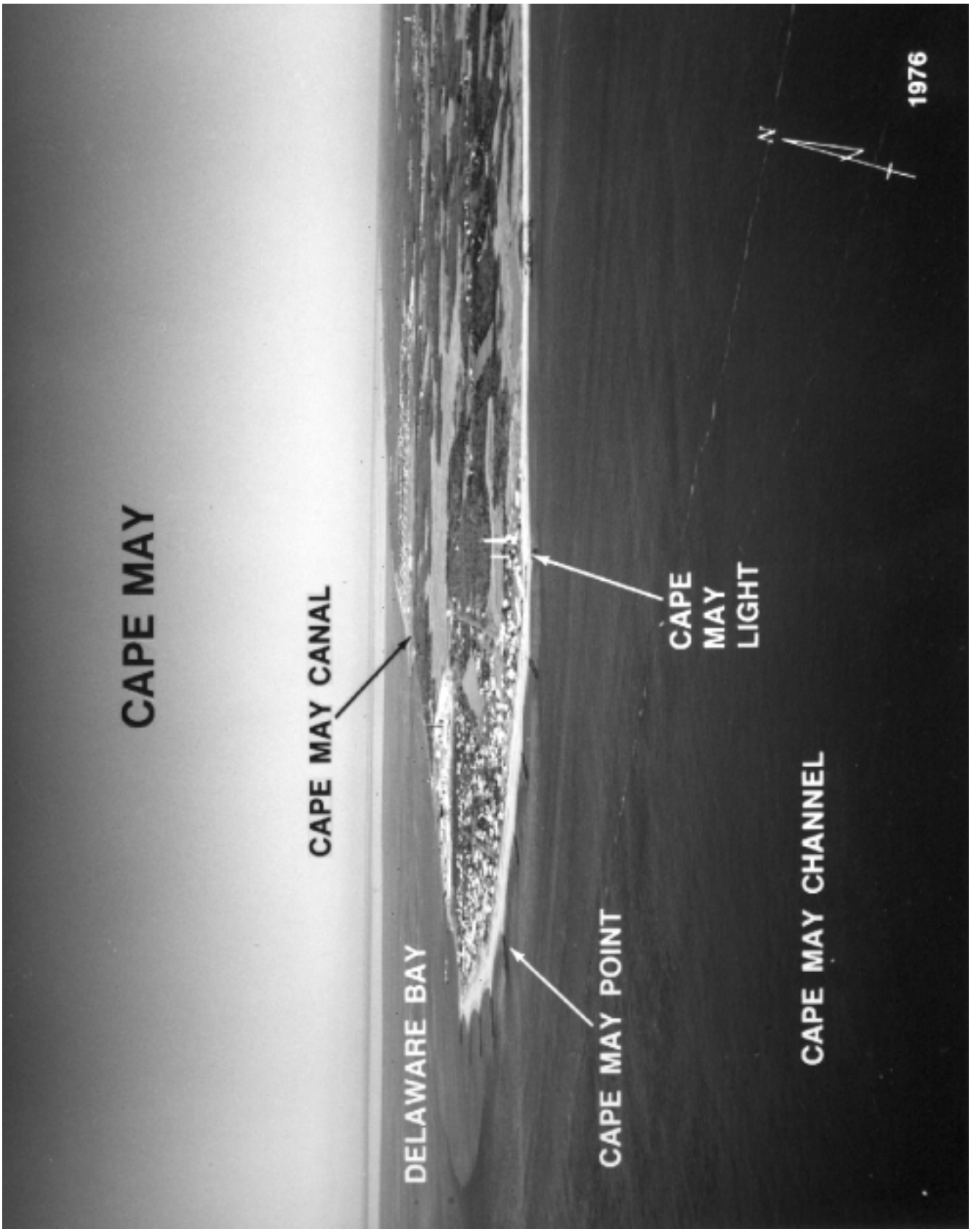
(72) The 100-fathom curve is 50 to 75 miles off Delaware Bay, and the 20-fathom curve is about 25 miles off. Depths inside the 20-fathom curve are irregular, and in thick weather a deep-draft vessel should not approach the coast closer than depths of 12 fathoms until sure of its position; the safest approach or passing courses would be outside Five Fathom Bank Lighted Buoy F (38°46.8'N., 74°34.5'W.) and Delaware Lighted Horn Buoy D (38°27.3' N., 74°41.8'W.).

(73) **Cape May** is the extensive peninsula on the northeast side of the entrance to Delaware Bay. **Cape May Light** (38°55'59"N., 74°57'37"W.), 165 feet above the water, is shown from a gray tower with a red lantern on Cape May Point.

(74) The shoals off Cape May are mixed clay and sand and have the consistency of hardpan; the ridges run in approximately the same directions as the currents. **Cape May Channel,** 1 mile southwest of the cape, is an unmarked passage between shoals, with depths from 2 to 6 feet on either side. The channel is seldom used, and then only by fishing vessels and pleasure craft; local knowledge is required for safe passage.

(75) The channels have strong currents, and many tide rips form near **Prissy Wicks Shoal,** which has depths as little as 2 feet about 2 miles south of Cape May Light. In Cape May Channel, the current velocity is 1.5 knots on the flood and 2.3 knots on the ebb.

(76) **Overfalls Shoal** has a depth of 10 feet about 4 miles southwestward of Cape May Light. The 30-foot curve extends 3 miles farther in the general direction of Cape Henlopen and has a depth of 16 feet just inside its outermost limit.


CAPE MAY
CAPE MAY CANAL
DELAWARE BAY
CAPE MAY POINT
CAPE MAY LIGHT
CAPE MAY CHANNEL
N
1976

(77) **McCrie Shoal,** 7 miles southeast of Cape May Light, has a least charted depth of 18 feet; a lighted gong buoy is on the southeast side of the shoal. A sunken wreck, covered 16 feet, is near the southwest side of the shoal in about 38°50'42.9"N., 74°54'02.5"W.

(78) **Five Fathom Bank** has a least charted depth of 17 feet about 15 miles eastward of Cape May Light. The area, inclosed by the 30-foot curve, is about 9 miles long, north to south, and about 2 miles wide. The greater part of Five Fathom Bank is within authorized fishtrap limits. Several buoys are moored around the bank.

(79) **Five Fathom Bank Lighted Buoy F** (38°46'49"N., 74°34'32'W.) is about 20 miles east-southeast of Cape May Light. The buoy is yellow, shows a flashing yellow light, and is equipped with a racon.

(80) **Cape Henlopen** (see also chart 12216), on the southwest side of the entrance to Delaware Bay, is marked by a number of towers and buildings. About 0.5 mile southward from the tip of the cape is a visual **reporting station** and radio control point for the Philadelphia Maritime Exchange.

(81) Cape Henlopen is building out from the northeastward to the northwestward; mariners are advised to exercise extreme caution in this area.

(82) A **naval restricted area** extends northeastward from Cape Henlopen to Overfalls Shoal. (See **334.110,** chapter 2, for limits and regulations.)

(83) **Hen and Chickens Shoal** extends southeastward from the tip of Cape Henlopen. The shoal has depths of 5 feet 1.3 miles from the tip of the cape and 12 feet 1.7 miles farther to the southeastward. The northeast side of the shoal is marked by buoys.

(84) The Cape May-Lewes Ferry crosses the main channel in Delaware Bay about 4 miles northward of Cape Henlopen. The ferry usually departs Lewes from the southern entrance to Harbor of Refuge and enters Lewes from the northern entrance to Harbor of Refuge.

(85) **Delaware Lighted Buoy D** (38°27.3'N., 74°41.8'W.), is about 28 miles southeastward of Cape Henlopen. The buoy is yellow, shows a flashing yellow light, and is equipped with a racon.

(86) A **Traffic Separation Scheme (Delaware Bay)** has been established off the entrance to Delaware Bay. (See chart 12214.)

(87) The scheme is composed basically of **directed traffic areas** each with one way inbound and outbound **traffic lanes** separated by defined **separation zones; a precautionary area;** and a **pilot boarding area.** The scheme is recommended for use by vessels approaching or departing Delaware Bay, but is not necessarily intended for tugs, tows, or other small vessels which traditionally operate outside of the primary traffic lanes or close inshore.

(88) **The Traffic Separation Scheme has been designed to aid in the prevention of collisions at the approaches to major harbors, but is not intended in any way to supersede or alter the applicable Navigation Rules. Separation zones are intended to separate inbound and outbound traffic lanes and to be free of ship traffic, and should not be used except for crossing purposes. Mariners should use extreme caution when crossing traffic lanes and separation zones.** (See Traffic Separation Schemes, chapter 1, for additional information.)

(89) The **precautionary area** for Delaware Bay entrance is inscribed by part of a circle with a radius of 8 miles centered on Harbor of Refuge Light (38°48.9'N., 75°05.6' W.) and extending from off Cape May Point to the shore south of Cape Henlopen with the traffic lanes fanning out from the circumference of the circle. The outer part of the northeast quadrant of the area is full of shoals, and there are shoal spots covered from 28 to 30 feet in the western extension of the Five Fathom Bank-Cape Henlopen Traffic Lane, about 1 mile west-northwestward of Delaware Bay North Approach Lighted Buoy 4. In the southeast quadrant, the eastern limit of Hen and Chickens Shoal is marked by Lighted Gong Buoy 1HC, Lighted Buoy 3HC, Delaware Bay Entrance Channel Lighted Gong Buoy 5, and a red sector of Harbor of Refuge Light. A wreck, covered 55 feet, is about 1 mile north of Delaware Traffic Lane Lighted Buoy DC. The usable part of the precautionary area has depths of 31 to over 100 feet. Several wrecks and obstructions, covered 40 to 54 feet, are about 1 to 1.7 miles east and southeast of Harbor of Refuge Light. Tugs and tows entering Delaware Bay from the north and northbound upon leaving the Bay often pass between Delaware Bay South Shoal Lump Lighted Buoy 8A and Delaware Bay Entrance Channel Lighted Buoy 6, and between Delaware Bay South Shoal Lump Buoy 8B and Delaware Bay Entrance Channel Lighted Buoy 8. This track allows tugs and tows to keep clear of large vessels entering the Bay through the pilot boarding area southward of Lighted Buoy 6. Since the precautionary area is used by both incoming and outgoing vessels, making the transition between Delaware Bay and the traffic lanes, extreme care is advised in navigating within the area.

(90) The **pilot boarding area**is about 2.5 miles southeastward of Cape Henlopen. (See pilotage later in this chapter.)

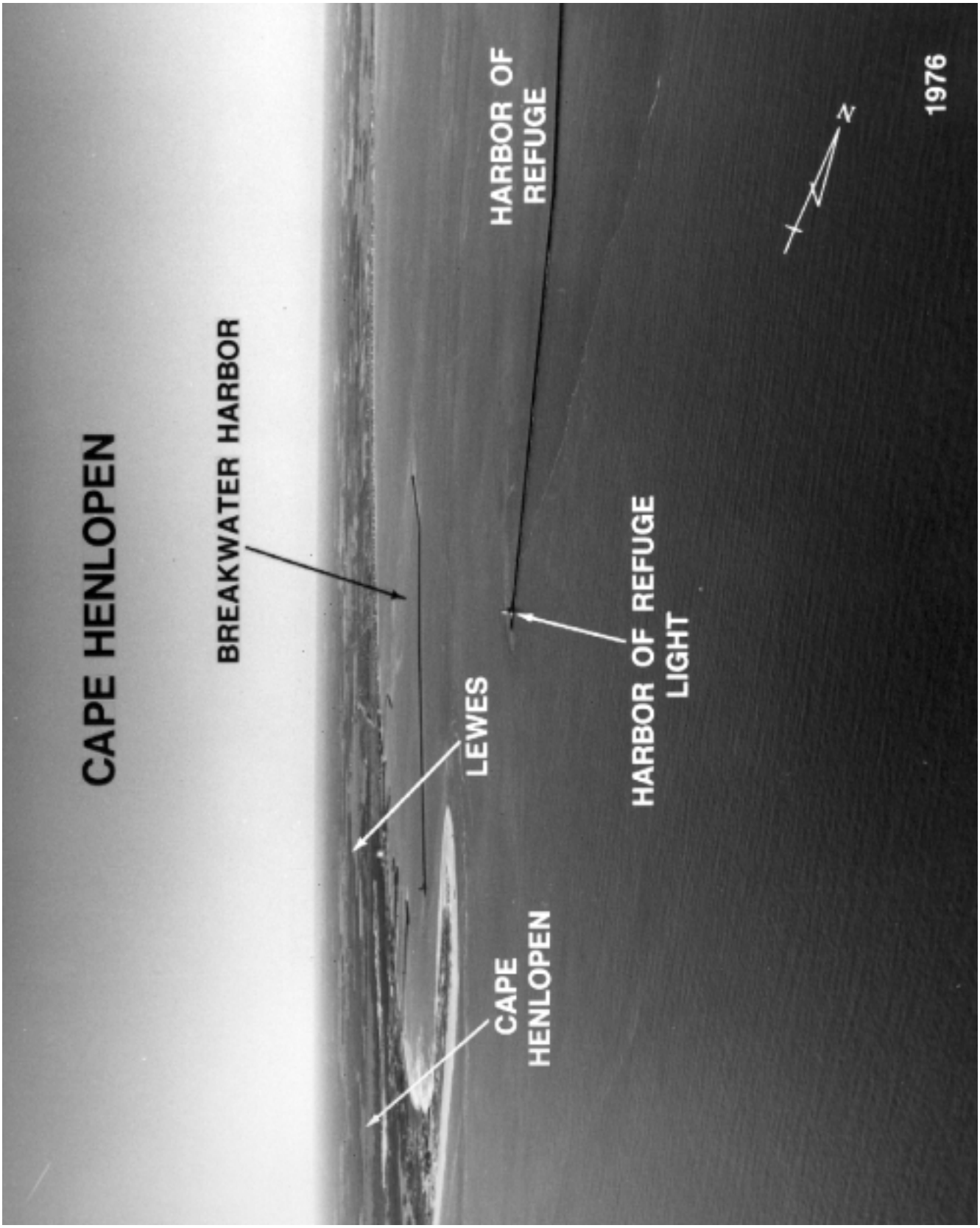
(91) **Eastern Directed Traffic Area:**

(92) **Five Fathom Bank to Cape Henlopen Traffic Lane, Inbound.–**The eastward approach to Delaware Bay is north of Five Fathom Bank Lighted Buoy F (38°46'49"N., 74°34'32"W.) in Five Fathom Bank-Cape Henlopen Traffic Lane that tapers from 2 miles to 1 mile wide in its 16.4-mile length. By entering the traffiFive Fathom Bank to Cape Henlopen Traffic Lane, Inbound.–The eastward approach to Delaware Bay is north of Five Fathom Bank Lighted Buoy F (38°46.8'N., 74°34.5' W.) in Five Fathom Bank-Cape Henlopen Traffic Lane that tapers from 2 miles to 1 mile wide in its 16.4-mile length. c lane 1.5 miles north of Five Fathom Bank Lighted Buoy F, a course of **268°** follows the centerline of the traffic lane to the precautionary area, thence west-southwesterly courses for about 5 miles passing southward of Delaware Bay North Approach Lighted Buoy 4, to the pilot boarding area. Reported depths in the traffic lane are 39 feet or greater.

(93) **Cape Henlopen to Five Fathom Bank Traffic Lane, Outbound.–**The eastward exit by outbound vessels is south of Five Fathom Bank Traffic Lane Buoy FB (38°46'51"N., 74°55'35"W.) through Cape Henlopen-Five Fathom Bank Traffic Lane that expands from 1 mile to 2 miles wide. By entering the traffic lane 1 mile southward of Lighted Buoy FB, a course of **091½°**follows the centerline of the outbound traffic lane. When seaward of Five Fathom Bank Lighted Buoy F steer usual courses to destination. Depths in the traffic lane are 40 feet or more.

(94) **Separation Zone.–**The eastern separation zone between the inbound and outbound traffic lanes is 1 mile wide centered on a line through Five Fathom Bank Lighted Buoy F, and two lighted buoys 7.5 miles and 16.4 miles, respectively, westward from the Five Fathom Bank Lighted Buoy F.

(95) **Southeastern Directed Traffic Area:**


CAPE HENLOPEN
BREAKWATER HARBOR
HARBOR OF REFUGE
LEWES
HARBOR OF REFUGE LIGHT
CAPE HENLOPEN
N
1976

(96) **Delaware to Cape Henlopen Traffic Lane, Inbound.–**The southeastward approach to Delaware Bay is north of Delaware Lighted Buoy D (38°27.3'N., 74°41.8'W.) in Delaware-Cape Henlopen Traffic Lane that tapers from 2 miles to 1 mile wide in its 21-mile length. By entering the traffic lane 1.5 miles northeastward of Delaware Lighted Buoy D, a course of **322°** follows the centerline of the traffic lane to the precautionary area, thence a northwesterly course for an additional 4.5 miles leads to the pilot boarding area. Depths in the traffic lane are 58 feet or more.

(97) **Cape Henlopen to Delaware Traffic Lane, Outbound.–**The southeastward exit by outbound vessels is southwestward of Delaware Traffic Lane Lighted Whistle Buoy DC (38°43.8'N., 74°57.6'W.) through Cape Henlopen-Delaware Traffic Lane that expands from 1 mile to 2 miles wide. By entering the traffic lane 1 mile southwestward of Lighted Whistle Buoy DC, a course of **145°** follows the centerline of the outbound traffic lane. When seaward of Delaware Lighted Horn Buoy D, steer usual courses to destination. Depths in the traffic lane are 48 feet or more.

(98) **Separation Zone.–**The southeastern separation zone between the inbound and outbound traffic lanes is 1 mile wide centered on a line through Delaware Lighted Buoy D and three lighted buoys 6.7, 13.6, and 20.6 miles, respectively, on a bearing of 323° from Delaware Lighted Buoy D.

(99) **Two-Way Traffic Route.–**An additional Traffic Separation Scheme has been established to better separate large inbound vessels from tug and barge traffic transiting easterly and northerly along New Jersey coastal route just northward of Five Fathom Bank to Cape Henlopen Traffic Lane. The scheme consists of a two-way traffic lane. The lane has a 0.5 mile width and a least known depth of 32 feet. For purposes of INTERNATIONAL RULE 10, this additional scheme has been adopted by the IMO. (See Traffic Separation Scheme, chapter 1, and **33 CFR 167**, chapter 2, for additional information.)

(100) A **Regulated Navigation Area** has been established in Delaware Bay and River. (See **165.1 through 165.13, and 165.510,** chapter 2, for limits and regulations.)

(101) **Channels.–**Delaware Bay is shallow along its northeastern and southwestern sides, and there are extensive shoal areas close to the main channel. The bay has natural depths of 50 feet or more for a distance of 5 miles above the Capes; thence Federal project depths of 40 feet to the upper end of Newbold Island, 110 miles above the Capes, thence 25 feet to the Trenton Marine Terminal, 115 miles above the Capes, and thence 12 feet to the railroad bridge at Trenton. (See Notice to Mariners and latest editions of the charts for controlling depths.)

(102) In May 1983, an obstruction, covered 38 feet, was on the east side of the channel about 0.8 mile east of Fourteen Foot Bank Light in about 39°02.9'N., 75°09.9'W.

(103) **Anchorages.–**In 1993, the NOAA ship WHITING reported vessels waiting offshore before taking on pilots and proceeding into Delaware Bay often anchor in the area between the Eastern Directed Traffic Area and Southeastern Directed Traffic Area. The area has a mostly sand bottom and offers good holding ground in depths of 31 to over 100 feet.

(104) Deep-draft vessels sometimes anchor in various places along the dredged channel through the lower bay, but usually continue to more sheltered areas in the upper bay and river. General, explosives, quarantine, and naval anchorages are in Delaware Bay and Delaware River. (See **110.1 and 110.157,** chapter 2, for limits and regulations.)

(105) Mariners are warned that submarine cables are in the north corner of the anchorage on the northeast side of New Castle Range. Furthermore, submerged pipelines are in the southwest part of the anchorage on the southeast side of Marcus Hook Range and in the middle of the anchorage southeast of Mifflin Range.

(106) In December 1983, shoaling to 34 feet was reported in the northeast corner of the anchorage off Mispillion River in about 39°01'12"N., 75°13'42"W.

(107) In bad weather tows and small craft sometimes anchor behind the breakwaters north and west of Cape Henlopen.

(108) **Tides.–**The mean range of tide is 4.2 feet in Breakwater Harbor, 5.5 feet at Reedy Point, 5.6 feet at Marcus Hook, 5.9 feet at Philadelphia, and 8.0 feet at Trenton. (See the Tide Tables for daily predictions for Breakwater Harbor, Reedy Point, and Philadelphia.)

(109) **Currents.–**The current velocity is 1.8 knots in Delaware Bay entrance. (See the Tidal Current Tables for daily predictions.) The tables also list current differences and other constants for about 55 other places in Delaware Bay and River.

(110) The Tidal Current Charts, Delaware Bay and River, present a comprehensive view of the tidal-current movement in the bay and river, and provide a means of readily determining the direction and velocity of the current at various places throughout the waterway. The charts may be used for any year and are referred to daily predictions for Delaware Bay Entrance.

(111) **Chesapeake and Delaware Canal**

(112) 1. There is no recommended length limitation for vessels using the C&D canal, however the maximum draft limitation is 33 feet.

(113) 2. Vessels in excess of 760 feet are required to have an operational bow thruster for transit. Vessels in excess of 886 feet are required to have an operational bow and stern thruster for transit. These oversized vessels may use a tug assist instead of a working thruster.

(114) 3. The maximum combined beam of vessels transiting the C&D canal at the same time is 190 feet.

(115) **Weather.**–Strong northwesterlies are prevalent from November through March; gales are encountered about 1 to 3 percent of the time. It has been reported that with sustained northwesterlies over an extended period of time, lower than predicted low tides may occur in Delaware Bay and River and its tributaries. Seas build to 10 feet (3 m) or more about 1 percent of the time from November through March. High seas are most likely with northwest or southeast winds. Average seas run 3 feet (0.9 m) from October through March. During the summer, prevailing southerlies are often reinforced by the sea breeze and afternoon windspeeds may reach 15 to 25 knots. Strong easterly or southeasterly winds sometimes cause high tides in the Delaware Bay and River, resulting in the flooding of lowlands and damage to bay and river front properties.

(116) Visibility is generally good although sometimes hampered by fog, precipitation, smoke, and haze. During the spring and early summer advection fog is carried into the bay on east and southeast winds; they can occur when a front stalls to the south or the Bermuda High is displaced northward. These fogs can be tenacious; they often lift somewhat during the day, particularly near the shore. Visibilities are worst from December through June. Fog is most frequent during April, May, and June

when visibilities drop below 0.2 mile (0.4 km) and about 3 percent of the time. Visibility of 2 miles (4 km) or less is most likely in January and February due to the greater frequency of precipitation, particularly snow. Fog is less likely in July, August, and September.

(117) **Ice.–**In ordinary winters there is usually sufficient ice in Delaware Bay and River to be of some concern to navigation. Thin ice has been known to form early in December between Chester and Philadelphia, but the heavier ice usually does not begin to run before January. The tidal currents keep the ice in motion, except where it packs in the narrower parts of the river; tugs and larger vessels from Philadelphia keep these parts of the river open. The ice usually packs heavier than elsewhere at Ship John Shoal, at Pea Patch Island, at Deepwater Point, and below Gloucester City. Ice is rarely encountered after the early part of March.

(118) In severe winters, navigation has occasionally been interrupted above Chester, but the powerful vessels employed in the foreign and coasting trade keep the channel fairly open. The greatest danger is to wooden vessels, which are liable to be cut through on the waterline if they encounter thin ice.

(119) **Freshets.–**Freshets are of rare occurrence, except in the vicinity of Trenton, and do not interfere with navigation unless accompanied by ice. Freshets and ice above Philadelphia are discussed further in the latter part of this chapter.

(120) **Pilotage, Delaware Bay and River** .–Pilotage on Delaware Bay, Delaware River, and tributaries thereof is compulsory for all foreign vessels of 100 gross tons or more and all U.S. vessels under register engaged in the foreign trade or commerce of 100 gross tons or more. Pilotage is optional for all U.S. Government vessels and for all U.S. vessels in the coastwise trade that have on board a pilot licensed by the Federal Government for these waters.

(121) Pilot services are provided on a 24-hour basis by the Pilots' Association for the Bay and River Delaware, Chesapeake and Interstate Pilots Association (Federal Pilots), and Interport Pilots Agency, Inc. (Federal Pilots).

(122) The Pilots' Association for the Bay and River Delaware maintains its office in Philadelphia, PA, a pilot station in Lewes, DE, and a pilot watch tower on Cape Henlopen. The office address is 800 South Columbus Blvd., Philadelphia, PA 19147; telephone, 215-465-8340; fax, 215-465-3970; telex, 5101002653; cable, DELPILOTS in Philadelphia; and email address: dispatch@delpilots.com. The pilot station address is 41 Cape Henlopen Drive, Lewes, DE 19958; telephone, 302-645-2228; fax, 302-645-7822. The pilot watch tower at Cape Henlopen's telephone number is 302-645-8538; fax, 302-645-1728. Pilots are generally arranged for in advance through ships' agents and board incoming vessels from the pilot boat in the pilot boarding area off Cape Henlopen. Vessels are requested to contact pilots when inbound at either Delaware Lighted Buoy D or Five Fathom Bank Lighted Buoy F; both buoys are equipped with a racon. Vessels not requiring pilots are requested to contact "Cape Henlopen Tower" one hour prior to entering or departing Delaware Bay.

(123) The pilot boats are 50 feet long with black hulls, and white houses with the word "PILOT" in large letters on each side. The pilot station and pilot boats may be contacted on VHF-FM channels 14 and 16. The pilots carry portable radiotelephones for bridge-to-bridge communications on VHF-FM channel 13.

(124) The Pilots' Association for the Bay and River Delaware also provides qualified offshore "advisors" for the deepest draft vessels between Lighted Buoy "D" and the anchorage areas in Delaware Bay. A notice of 24 hours before estimated arrival is requested for this service.

(125) The Chesapeake and Interstate Pilots Association offers pilot services to U.S. vessels engaged in the coastwise trade and to public vessels between Cape Henlopen, Philadelphia and Delair. Arrangements for pilots are made through ships' agents or the pilot office in Norfolk (telephone, 757-855-2733). Pilots use commercial launch services and will meet vessels in the Pilotage Area off Cape Henlopen. Pilots monitor VHF-FM channel 16 one hour prior to last ETA. Advance pilot ordering requested with 6-hour ETA update and any subsequent changes requested. The pilot office can also be contacted through the Maritel Marine Operator.

(126) The Interport Pilots Agency, Inc. offers pilotage to public and U.S. vessels in the coastwise trade transiting to Baltimore, the Chesapeake and Delaware Canal, Philadelphia, New York, Long Island Sound, Cape Cod Canal, and ports in the northeast. Arrangements for any of the above services are made in advance through ships' agents or with Interport Pilots Agency, Inc., Port Monmouth, NJ 07758-0236. Telephone (24 hours) 800-346-4877 or 908-787-5554, FAX 908-787-5538, cable PORTPILOTS. An updated 12-hour estimated time of arrival (ETA) is requested.

(127) Their 48-foot pilot boat INTERPORT II, with a black hull and white house, meets vessels in the pilot area off Cape Henlopen. The INTERPORT II monitors VHF-FM channel 16 two hours prior to the vessels scheduled ETA, and uses channels 7A and 14 as working frequencies. Vessels are requested to provide a lee for the pilot boat, maintain about 5 knots, and rig a pilot ladder 5 feet above the water.

(128) **Vessels entering Delaware Bay with drafts of 35 feet or more should use the Delaware to Cape Henlopen Traffic Lane.**

(129) **The Ports of Philadelphia Maritime Exchange,** in cooperation with the Pilots Association for the Bay and River Delaware, has established a communication and information system for vessels operating in the Delaware Bay and rivers. The lower bay area is monitored by "Cape Henlopen Tower" and the upper bay and rivers are handled by Ports of Philadelphia Maritime Exchange. Ship reporting services are provided through these two stations on VHF-Fm channel 14. VHF-FM channels 20 and 74 are also used for port operations. Vessels are requested to pass information related to position, ETA, docking instructions, arriving/departing piers or anchorages in the upper bay and river to the Ports of Philadelphia Maritime Exchange.

(130) To obtain the maximum benefits of this service, ships are requested to monitor VHF channels 14 and 16 while transiting Delaware Bay and River.

(131) **Towage.–**A large fleet of tugs operating out of Philadelphia is available at any time of the day or night for any type service required. Most of the tugboat companies will dispatch their vessels to any place in Delaware Bay or its tributaries. Some of the companies also have tugs available for deep-sea towing.

(132) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(133) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) Vessels subject to boarding for quarantine inspection and destined to points above Marcus Hook are required to anchor off

the Marcus Hook boarding station. Detention cases are taken to Philadelphia General Hospital. (See **110.157 (a)(8), and (b),** chapter 2, for quarantine anchorage regulations and limits.)

(134) Philadelphia is a **customs port of entry.**

(135) **Coast Guard.–** A **vessel documentation** office is in Philadelphia, Pa. (See appendix for address.)

(136) **Supplies.–**Bunker oil is available in quantity at Philadelphia and at several other places. Most large vessels are bunkered from barges alongside. Freshwater is unlimited in the larger ports. Small craft can obtain fuel and supplies not only in the larger ports, but at many of the smaller cities and towns along the river and bay.

(137) **Repairs.–**The largest shipyard along Delaware River is at Chester. Many of the other cities and towns have boatyards for small craft.

(138) **Chart 12216–**Delaware Breakwater is the popular name for the anchorage areas behind the outer and inner breakwaters north and west of Cape Henlopen. Harbor of Refuge is the outer and deeper of the two areas; Breakwater Harbor is the inner area.

(139) **Harbor of Refuge** is behind the breakwater that begins 0.7 mile north of Cape Henlopen and extends 1.3 miles in a north-northwestward direction. A line of ice breakers, marked by lights at the outer ends, extends 0.4 mile in a west-southwest direction onto **The Shears** from a position 0.4 mile northwestward of the north end of the breakwater. **Harbor of Refuge Light**, (38°48.9'N., 75°05.6'W.), 72 feet above the water, is shown from a white conical tower on a cylindrical substructure near the south end of the breakwater; the station has a fog signal. A light marks the breakwater near its northern end.

(140) The harbor has depths of 17 to 70 feet between the breakwater and a shoal ridge, 8 to 12 feet deep, 1 mile to the southwestward. The deepest water is behind the Harbor of Refuge Light. The entrance from southeastward is deep and clear, while that from northwestward across The Shears has depths of 10 feet or less. Harbor of Refuge affords good protection during easterly gales. A strong set into Harbor of Refuge reportedly occurs across the southern entrance during tidal floods.

(141) **Breakwater Harbor,** between the inner breakwater and the shore, is excellent for light-draft vessels in all weather except heavy northwesterly gales and even then affords considerable protection.

(142) The inner breakwater begins 0.3 mile southwest of the tip of Cape Henlopen and extends 0.8 mile in a west-northwest direction. A light is shown from a skeleton tower on the west end of the breakwater. A dangerous sunken wreck, covered 15 feet, is about 0.3 mile 300° from this light.

(143) The Lewes terminal of the **Cape May-Lewes Ferry** is in the basin at the southwest end of Breakwater Harbor, 1.3 miles southwest of Delaware Breakwater Light. The basin is protected on its west side by a breakwater marked by a light.

(144) Two dredged channels lead through Breakwater Harbor to the ferry basin; one leads from the northeastward along the southeast side of the harbor, and the other leads from the northward along the west side of the harbor. In September-October 1980, the channel leading from the northeastward, and the ferry basin, had controlling depths of 10 feet. In October 1980, the channel leading from the north had a controlling depth of 10 feet. Depths of 5 to 12 feet are reported in other parts of Breakwater Harbor. Cape Henlopen is steadily building out from the northeastward to the northwestward; mariners are advised to proceed with caution in this area.

(145) A **naval restricted area** is in the eastern part of the harbor. (See **334.110,** chapter 2, for limits and regulations.)

(146) **Chart 12304.–**The low, marshy southwestern shore of Delaware Bay has few prominent marks above Cape Henlopen. There are scattered groups of houses, a few observation towers, and the lights and ranges of the tributaries.

(147) The tributaries are narrow and crooked, and vessels have difficulty making some of the turns. These streams are little used except by local fishing boats and by vessels carrying petroleum products to the towns along the banks. Strangers seldom attempt to enter. When entering or leaving these tributaries, allowance should be made for the bay currents which set across the entrances and have considerable velocity at times.

(148) There are many shoal spots with depths as shallow as 2 to 6 feet between Cape Henlopen and Bombay Hook Point (39°18.7'N., 75°26.5'W.). Most of the spots are unmarked and are subject to some change, both in depth and position. In August 1980, shoaling to 5 feet was reported about 3.1 miles east of the entrance to Leipsic River in about 39°14.3'N., 75°20.3'W. Strangers should proceed with caution in any of the passages southwest of the ship channel.

(149) Buoys mark a passage along the southwestern side of Delaware Bay from a point about 7.7 miles northwestward of Cape Henlopen and about 3 miles offshore to the entrance to Murderkill River. The many fish and oyster stakes in the area are to be avoided. A buoy marks a dangerous sunken wreck about 3.6 miles southeast of Murderkill River. The passage should not be attempted at night.

(150) Vessels entering the southwestern passage from northward usually leave the main ship channel about 2.5 miles below Ship John Light and head in a southerly direction for the vicinity of the lighted buoy off Murderkill River. A depth of 7 feet can be carried through this passage, but care is necessary to avoid the 4-foot spot 2 miles off Little River.

(151) Roosevelt Inlet (chart 12216), 3 miles west of Cape Henlopen, is described in chapter 8.

(152) **Mispillion River,** protected at the entrance by jetties, empties from the westward into Delaware Bay 13 miles northwest of Cape Henlopen. The jetties, about 200 feet apart, extend about 1 mile southeastward from shore. The jetties are marked at the seaward ends by lights. The river is used by pleasure and fishing craft, and oil barges bound for Milford.

(153) In May 2001, the controlling depths were 3.9 feet off the entrance to the jetties, thence 6.1 feet through the jetties, thence 2.9 feet to the Mispillion River Buoy 2; thence in 1988, the centerline controlling depth was 2 feet to the State Route 14 bascule bridge just east of **Milford**, thence the river channel shoals from 2 feet to 1½ feet at Milford. Mariners are advised to approach the channel from the northeast for the greatest depths.

(154) The mean range of tide is 4.6 feet in the entrance. The current velocity is 1.5 knots on the flood and 1.0 knot on the ebb. In 1980, it was reported that current velocities up to 3 knots on the flood and 4 knots on the ebb may be encountered in the river. In 1968, an abnormal tidal cycle characterized by a long period at high water and a rapid change to low water, was observed at the entrance to Mispillion River. Occasional periods of lower than normal low water levels were also encountered.

(155) Small-craft facilities just inside the mouth of Mispillion River, on Cedar Creek, and just above the fixed bridges about 1 mile below Milford, can provide gasoline, diesel fuel, and water. The oil terminal about 1 mile below Milford has about 5 feet alongside, and the wharves at Milford have 5 to 7 feet alongside; mud bottom.

(156) An overhead power cable with a clearance of 57 feet crosses the river about 7 miles above the mouth. About 1.1 miles below Milford, the river is crossed by twin fixed highway bridges which have a clearance of 25 feet. About 0.5 mile below Milford, a highway bridge, with a 45-foot bascule span and a clearance of 5 feet, crosses the river. (See **117.1 through 117.59 and 117.241,** ,chapter 2, for drawbridge regulations.) An overhead power cable with a clearance of 45 feet is just southwest of the bascule bridge. A boatyard with a 25-ton mobile lift is just east of the bascule bridge. The fixed highway bridge at Milford is the head of navigation. A marine railway just below this bridge can haul out craft up to 55 feet for repairs.

(157) A **danger zone** of a naval aircraft bombing area extends 2 miles offshore off **Milford Neck,** just north of the entrance to Mispillion River. (See **334.120,** chapter 2, for limits and regulations.)

(158) **Murderkill River,** 21 miles northwestward of Cape Henlopen, is used by fishing vessels and a few pleasure craft. In May 2001, the controlling depth was 3.1 feet in the dredged entrance channel, thence in 1957, reported depths of 4½ feet to **Frederica**, about 6.5 miles above the mouth. A piling, which uncovers 3 feet, is on the northwest edge of the entrance channel in about 39°03'40"N., 75°23'22"W. The mean range of tide is 4.8 feet in the entrance.

(159) A **247°** lighted range, a light, and buoys mark the entrance to Murderkill River.

(160) **Bowers Beach,** a summer resort on the north side of the entrance to Murderkill River, is prominent from offshore. Gasoline and some marine supplies are available. The wharves along Murderkill River are used extensively by fishing and oyster boats. The overhead cables crossing the river at Bowers Beach have a clearance of 50 feet, and the overhead power cable crossing about 4.3 miles above the mouth has a clearance of 62 feet. The fixed highway bridge, 6 miles above the mouth, has a clearance of 12 feet.

(161) **St. Jones River,** 0.5 mile north of Murderkill River, leads to the city of **Dover,** about 9.5 miles above the mouth, the capital of Delaware. In 1965, the controlling depths were less than a foot in the marked entrance channel, thence 4 feet to Lebanon, and about 3 feet to Dover. The mean range of tide is 4.8 feet in the entrance; the current velocity off the entrance is about 0.7 knot.

(162) An overhead power cable with a clearance of 60 feet crosses the entrance to St. Jones River; another power cable, 2.4 miles above the mouth, has a clearance of 56 feet. The U.S. Route 113 highway bridge at **Barkers Landing,** about 3 miles above the mouth, has a fixed span with a clearance of 24 feet. A highway bridge at **Lebanon**, 6 miles above the mouth, has a swing span with a width of 29 feet and a clearance of 6 feet. The overhead power cable at the drawbridge has a clearance of 50 feet. (See **117.1 through 117.49,** chapter 2, for drawbridge regulations.) The fixed highway bridge 9 miles above the mouth has a clearance of 11 feet. There are no landings at Dover.

(163) **Little River** (39°09.6'N., 75°24.5'W.) is 26 miles northwest of Cape Henlopen. A light marks the approach to the entrance. In 1974, the controlling depth was 2 feet in the entrance channel and 1½ feet to the fixed highway bridge at the town of **Little Creek,** 2 miles above the river mouth. An overhead power cable with a clearance of 52 feet crosses the river 0.2 mile below the fixed highway bridge.

(164) **Mahon River** empties into Delaware Bay at **Port Mahon,** 27 miles northwest of Cape Henlopen. The river is used by commercial fishing boats, and small fuel barges. The controlling depth is about 8 feet in the marked entrance channel with deeper water inside. The Dover Air Force Base fuel pier, about 200 feet long with reported depths of 10 feet along the east side, is on the west side of the entrance. Some marine supplies can be obtained at the landing 0.4 mile above the mouth. A State-maintained boat launching facility with floating piers is on the west side of the river 0.8 mile above the mouth. The mean range of tide is 5.4 feet in the entrance.

(165) **Leipsic River,** 30 miles northwestward of Cape Henlopen, is used occasionally by fishermen. In 1980, the reported depths were 5 feet in the entrance and deeper water inside to Leipsic, 7 miles above the mouth. The entrance is marked by a light. The mean range of tide is 5.5 feet in the entrance and 3.5 feet at Leipsic. The wharves at **Leipsic** have depths of 5 to 8 feet alongside. The fixed highway bridge at Leipsic has a clearance of 13 feet.

(166) **Smyrna River** (39°22.0'N., 75°30.7'W.) (see also chart 12311), 39 miles northwest of Cape Henlopen, is navigable to **Smyrna Landing,** about 8 miles above the mouth and 1 mile from the town of **Smyrna.** In May 1971, the reported centerline controlling depth was 5 feet to Flemings Landing, thence in 1964, 3 feet to Smyrna Landing.

(167) The entrance to the Smyrna River is protected by jetties. A buoy marks the outer end of the south jetty; ruins of the former south jetty light may be in the vicinity of the outer end of the jetty. In May 1983, it was reported that the south jetty had collapsed; caution is advised. Within the river, the best water generally follows a midchannel course or favors the ebbtide bends.

(168) The current velocity is about 1.5 knots in the entrance to Smyrna River. State Route 9 highway bridge at **Flemings Landing,** 3 miles above the mouth, has a swing span with a width of 36 feet and a clearance of 5 feet. (See **117.1 through 117.59 and 117.245,** chapter 2, for drawbridge regulations.) This bridge is seldom opened as the river is little used above the bridge. Overhead power cables with a least clearance of 48 feet cross the river about 0.8 mile above the bridge.

(169) **Local magnetic disturbance.–**Differences of as much as 5° from the normal variation have been observed near the mouth of Smyrna River.

(170) The New Jersey side of Delaware Bay is low, with few prominent marks. The principal tributaries are Maurice and Cohansey Rivers, which can be used as harbors of refuge by small boats going between Cape May Canal and the Chesapeake and Delaware Canal; there are also many small creeks used mostly by fishing boats. General depths along this side of the bay are 7 to 15 feet, but there are many spots with depths of less than 6 feet. The shoals generally are not marked, and some local knowledge is needed to avoid them. Most of the creeks have bars across their mouths.

(171) The channels have strong currents, and many tide rips form near Prissy Wicks Shoal. In unmarked Cape May Channel, the current velocity is 1.5 knots on the flood and 2.3 knots on the ebb. In the channel immediately northwestward of Overfalls

Shoal, the velocity is 2 knots on the flood and 1.9 knots on the ebb.

(172) **Cape May Canal,** 2 miles northward of Cape May Light, is described in chapter 5 in connection with the Intracoastal Waterway. Farther north are several creeks. The first of any importance to navigation is **Bidwell Creek** (39°07.7'N., 74°53.4'W.), a drainage canal 12 miles north-northeastward of Cape May Light; a private lighted buoy is off the entrance. In 1980, the controlling depth in the jettied entrance was reported to be about 1 foot. Strong currents may be encountered at and inside the entrance jetties, and entry at night during bad weather is extremely hazardous.

(173) **Deadman Shoal,** 9 miles north-northwestward of Cape May Light, has a minimum depth of 5 feet. The shoal is marked by a lighted buoy. A ridge with depths of 5 to 7 feet begins a mile westward of Deadman Shoal and extends southward for about 3 miles.

(174) **Dennis Creek,** 14 miles north-northeastward of Cape May Light, has depths of about 2 feet over the flats at the mouth and much deeper water inside to **Jakes Landing,** about 3 miles upstream. The creek is navigable for a considerable distance, but has no commerce and is little used.

(175) **Maurice River** flows into the northeast corner of **Maurice River Cove** 17 miles north-northwestward of Cape May Light. **East Point,** on the east side of the entrance, is marked by a light. Large shellfish plants are along the lower part of the river; shipbuilding facilities are at Dorchester.

(176) Maurice River is entered through a partially-dredged crooked channel that passes east of **Fowler Island,** which is in about the middle of the river's mouth. The northernmost section passing east of the island has natural depths.

(177) When approaching Maurice River, mariners should use care and not confuse the structure of East Point Light with a private house with a tower about 1.3 miles to the east; both landmarks are similar in appearance.

(178) In October 1996, the controlling depth was 6 feet in the entrance channel; thence in 1985, 5 feet on the centerline to Mauricetown, and in 1967, 6 feet to Millville. The entrance channel is marked by lighted and unlighted buoys. The river channel above Mauricetown to Millville is marked by seasonal buoys. In September 1996, a submerged object was reported in the channel, about 40 feet east of Buoy 7.

(179) For about 15 miles above the mouth of Maurice River, the channel is easily followed, but a sharp lookout is necessary to avoid stakes and dolphins extending into the river, many of which are broken off and covered at high water. Without local knowledge, it is safer to navigate this part of the river on a rising tide and proceed with caution. The upper part is narrow, but not difficult to navigate when the buoys are on station.

(180) The mean range of tide is 5.7 feet in the entrance to Maurice River and 6 feet at Millville. The current velocity is about 1 knot in the entrance and about 2.3 knots at Mauricetown; at Millville, the flood is very weak and the ebb velocity is 0.4 knot. Owing to dereliction of the dikes along the river, greater current velocities have been reported; extreme care is required in docking.

(181) **Ice** may be encountered on Maurice River from the latter part of December through the early part of March.

(182) The shellfish industry is concentrated along the lower part of Maurice River with plants at the towns of **Bivalve, Port Norris,** and **Shell Pile,** about 3 miles above the mouth. The wharves have depths greater than 7 feet alongside. Gasoline is available.

(183) A marina on the west side of the river about 3.5 miles above the mouth has berthing with water and electricity, a 20-foot boat ramp, gasoline, diesel fuel, ice, and marine supplies. Hull and engine repairs can be made. A 50-foot marine railway and a 12-ton mobile hoist are available.

(184) There is a small-craft facility at Bivalve, on the east side of the river about 3 miles above the mouth, and several other facilities on the east side of the river from about 4.5 miles to 6 miles above the mouth. Most of these facilities can provide gasoline, diesel fuel, berths, and marine supplies.

(185) The shipyard at **Dorchester,** 9 miles above the mouth of Maurice River, has a 165-foot railway. A marina at Dorchester has gasoline, slips, a 60-foot marine railway, and a 20-ton mobile hoist. Hull and engine repairs can be made at all of the facilities.

(186) At **Mauricetown,** 10 miles above the mouth of Maurice River, a vertical lift bridge with a clearance of 25 feet is maintained in the closed position. (See **117.731,** chapter 2, for drawbridge regulations.) The overhead power cable 300 yards southward has a clearance of 60 feet.

(187) **Port Elizabeth** is 1 mile up **Manumuskin River** and about 12 miles above the mouth of Maurice River. About 1.5 miles above Port Elizabeth on Maurice River is a boatyard with a 40-foot marine railway; hull and engine repairs can be made.

(188) **Millville,** 20 miles above the mouth of Maurice River, has several factories but no municipal docks. An overhead power cable about 1 mile south of Millville has a clearance of 67 feet. The fixed highway bridge at Millville has a clearance of 4 feet, and is the head of navigation.

(189) **Egg Island Point** (39°10.8'N., 75°08.2'W.), 17 miles north-northwest of Cape May Light, is marked by a light. Southward of the point are **Egg Island Flats,** which have depths as little as 3 feet. The flats are thick with oyster-bed stakes. Between Egg Island Point and the inner end of the flats is a slough, with depths of 7 feet, used by local boats.

(190) **Fortescue Creek,** 4 miles north-northwestward of Egg Island Point, has a directional light at the south side of the entrance. The entrance channel is marked by buoys and the directional light at the mouth of the creek. In September 1986, the controlling depth was 2 feet over the bar at the mouth of the creek, thence 2 feet on the centerline of the creek to the highway bridge at **Fortescue,** a small summer settlement on the south side 0.4 mile above the entrance. Gasoline, diesel fuel, and some supplies can be obtained. Near the bridge are two marine railways that can haul out boats up to 45 feet.

(191) **Nantuxent Point,** 8 miles northwestward of Egg Island Point, is on the southeast side of the entrance of **Nantuxent Cove.** The point is marked by a light. A lighted buoy marks the outer limit of the 5-and 6-foot spots that extend over a mile offshore from the point.

(192) **Nantuxent Creek,** on the north side of Nantuxent Point, has depths of about 5 feet in the mouth and is navigated at high water by local fishing boats for about 5 miles to within 1 mile of the village of **Newport.** A small-craft facility is at **Money Island,** a town about 1.2 miles above the mouth. Gasoline, berths, and limited marine supplies are available here.

(193) **Back Creek,** 27 miles northwest of Cape May Light and 2 miles northwestward of Nantuxent Point, is used by local boats as an anchorage. The entrance is marked by a private lighted buoy. The creek has depths of about 5 feet over the flats at the en-

trance and good depths for several miles above; however, local knowledge is advised. Berths, gasoline, and marine supplies are available at a landing 5 miles above the mouth. Hull and engine repairs can be made; lift, 6 tons.

(194) **Ben Davis Point** is on the northwest side of the entrance to Nantuxent Cove. It is marked by a light. Shoals to be avoided are the rock awash about 1.2 miles southwestward of the point and 5-foot **Ben Davis Point Shoal,** which is 2.5 miles south-southwest of the point and within 0.7 mile of the main channel through the bay.

(195) **Cohansey River,** which empties into the northeast side of Delaware Bay 31 miles northwestward of Cape May Light, is used mostly by pleasure craft, although some petroleum is transported to Bridgeton. **Cohansey Light** (39°20.5'N., 75°21.7'W.), 42 feet above the water, is shown from a black skeleton tower with a white daymark on the south side near the natural entrance. A dredged cut through the narrow neck of land on which the light stands gives a more direct approach to the river; the cut, 0.3 mile northwest of Cohansey Light, is marked on its west side by lights at the inner and outer ends. The river is unmarked above the dredged cut. In April 1990, the controlling depths were 5 feet to Fairton; thence 6 feet to approximately 600 yards south of Bridgeton and 1 foot to Bridgeton. In June 1982, a submerged obstruction was reported about 25 yards 145° from Cohansey Outer Light 1; caution is advised.

(196) The usual approach to Cohansey River is along the axis of the dredged cut, but the natural channel eastward of Cohansey Light is sometimes used; the latter has a controlling depth of about 7 feet, and unmarked shoals with depths of 4 to 6 feet must be avoided on either side. Local knowledge is advised when using this approach and in the dredged channel in the upper part of the river off Bridgeton.

(197) The mean range of tide is 6.0 feet in the entrance and 6.5 feet at Bridgeton; high water at Bridgeton is about 2 hours later than at the entrance. The current velocity is about 1.3 knots half a mile above the entrance and less than 0.5 knot at Bridgeton.

(198) There are small-craft facilities near **Greenwich Pier**, 4 miles above the mouth, and at **Fairton**, 14 miles above the mouth. Gasoline, diesel fuel and marine supplies are available; lift of 30 tons can handle hull and motor repairs.

(199) **Bridgeton,** about 17 miles above the mouth, is an important manufacturing town and rail center, but has no municipal piers or marinas. Broad Street bridge at Bridgeton has a 40-foot bascule span and a clearance of 6 feet, but is kept in a closed position. (See **117.711,** chapter 2, for drawbridge regulations.) The overhead power cable 0.2 mile below the bridge has a clearance of 44 feet.

(200) **Chart 12311.–Bay Side** (39°22.8'N., 75°24.2'W.) is a fishing resort on the east side of the entrance to **Stow Creek.** The creek has very little traffic.

(201) The dividing line between **Delaware River** and Delaware Bay is 42 miles above the Delaware Capes. The line, defined arbitrarily by the legislatures of Delaware and New Jersey, extends from a monument on **Liston Point,** Del., to a similar monument on the south side of the entrance to **Hope Creek,** N.J.

(202) In 1967, the monument on Liston Point was reported destroyed; and in 1983, the monument on the south side of the entrance to Hope Creek was also reported destroyed. Remains of the structure from Liston Point may exist up to 100 feet offshore and may be covered during high tide.

(203) **Bridges.**–For regulations affecting drawbridges crossing the Delaware River see **117.1 through 117.59, 117.716, and 117.904,** chapter 2.

(204) **Artificial Island,** Mile 44E, is the name given to the peninsula formed by the filled area covering most of **Baker Shoal.** The domes of the Salem Nuclear Power Plant, at the south end of the island, are prominent from upstream and downstream. An unmarked channel leads to a basin south of the powerplant. In 1980, 18 feet was reported in the channel and basin.

(205) **Local magnetic disturbance.–**Differences of as much as 2° to 5° from normal variation have been observed along the channel from Artificial Island to Marcus Hook.

(206) **Alloway Creek,** Mile 47.5E, has a controlling depth of about 3 feet to Quinton. The approach to Alloway Creek is unmarked. The shoals on either side of the mouth must be avoided. Above the mouth, the best water is not always in midstream, and some local knowledge is needed to find it. The current velocity is 2.1 knots 0.2 mile above the entrance and about 1.4 knots at New Bridge. An overhead power cable crossing the creek about 0.8 mile above the mouth has a clearance of 80 feet.

(207) The Mill Street highway bridge at **Hancocks Bridge,** 4 miles above the mouth of Alloway Creek, has a swing span with a width of 40 feet at the north draw and a clearance of 4 feet. An overhead power cable on the west side of the bridge has a clearance of 50 feet. Salem County Bridge at **New Bridge,** 5.5 miles above the mouth, has a swing span with a width of 35 feet and a clearance of 3 feet. The State Route 49 highway bridge at **Quinton,** 8 miles above the mouth, has a swing span with a width of 30 feet and a clearance of 3 feet. The bridge is maintained in the closed position. (See **117.1 through 117.59 and 117.701,** chapter 2, for drawbridge regulations.) An overhead power cable on the west side of this bridge has a clearance of 50 feet.

(208) **Salem River** is entered through **Salem Cove** at Mile 50E, across the Delaware River from the entrance to the Chesapeake and Delaware Canal. The approach channel follows the southeast side of Salem Cove for about 2 miles to the mouth of the river; it is marked by a lighted buoy, lights, and a lighted **027.3°** range. Within the river, the channel enters a land cut 0.8 mile above the mouth, thence leads to a basin at **Salem**, thence to the head of the project at the highway bascule bridge in Salem. In November 2000, the controlling depth was 13.4 feet (15.4 feet at midchannel) to Light 14; thence in 1999-November 2000, 12.2 feet through the landcut with 14 to 16 feet in the basin, thence November 2000, 16.0 feet to the head of the project near the highway bridge at Salem. Above the bridge, in 1976, the depths were 2 feet or less. Overhead power cables on the Salem River have a least clearance of 50 feet.

(209) The mean range of tide is 5.6 feet at Salem; the tides at Salem are about 35 minutes later than at Reedy Island. The current velocity is about 1.6 knots in the entrance. The maximum expected current in the land cut is 3 knots.

(210) State Route 49 highway bridge, 1.8 miles above the mouth, has a bascule span with a clearance of 5 feet. (See **117.1 through 117.59 and 117.749,** chapter 2, for drawbridge regulations.) Overhead power cables above and below the bridge have a least clearance of 50 feet.

(211) Several marinas and boatyards are along the north bend of Salem River and at Salem; slips, gasoline, and some marine supplies are available; hull and engine repairs can be made. Mobile lifts up to 25 tons are available along Salem River.

(212) **Appoquinimink River** (39°26.9'N., 75° 34.7'W.), Mile 44W, has no commerce and is little used except by pleasure craft and a few fishing boats. Controlling depth to Odessa is about 2 feet. The current velocity in the entrance is about 1.1 knots. The fixed highway bridge, 3 miles above the mouth, has a width of 37 feet and a clearance of 6 feet. The fixed highway bridge at **Odessa**, 5.5 miles above the mouth, has a width of 38 feet and a clearance of 4 feet. Overhead power cables across the river have a minimum clearance of 52 feet.

(213) **Reedy Island,** Mile 48W, is the site of a former Federal quarantine and detention station. The pier on the channel side of the island has a depth of 10 feet at the outer end; the current velocity is about 2.5 knots off the pier. A submerged dike extends 3 miles southward from Reedy Island and roughly parallels the western shore; the dike is marked by lights, and unlighted seasonal warning buoys.

(214) **Port Penn** is a village on the western shore opposite Reedy Island. The best approach to the village is through an opening in the Reedy Island dike; the opening, 0.2 mile south of the island, is 5 feet deep and 150 feet wide, and marked on each side by a daybeacon. Approaches to the village from north of Reedy Island or from south of the dike are over flats with depths of 2 feet. Anchorage depths off Port Penn are 15 feet or more, but in 1980, none of the landings at the village were usable.

(215) The **Chesapeake and Delaware Canal**, Mile 51W, is described in chapter 7.

(216) **Pea Patch Island**, Mile 53W, is the site of **Fort Delaware State Park**. The wharf, on the main channel, is marked by a light. In 1983, the wharf was in ruins. The area around the wharf is fouled with rocks which extend about 220 yards southwest along the shoreline of Pea Patch Island. A dike, mostly submerged at high water, extends northward along **Bulkhead Shoal** for about 3 miles from Pea Patch Island; the dike is marked by lights and daymarkers. A private fog signal and racon are located on an overhead power cable tower about 0.8 mile N of Pea Patch Island. The current velocity is 2.3 knots in the main channel east of the island. A ferry runs between Delaware City and Pea Patch Island on weekends, April through October.

(217) **Delaware City** is on the southwest side of Delaware River opposite Pea Patch Island. **Delaware City Branch Channel** extends southward from the riverfront of the town to the Chesapeake and Delaware Canal. A light marks the Delaware River entrance to Delaware City Branch Channel. In May 1999, the controlling depth was 5 feet in the channel entrance from the Delaware River shoaling rapidly along the sides; thence in 1983, the controlling depth was 6 feet in the channel. Depths alongside the Delaware City bulkhead were 7½ feet to bare in May 1999. The entrance channel at the Chesapeake and Delaware Canal end of the branch channel was reported, in July 2000, to have a depth of 7 feet; a submerged pile was reported on the west side of the channel. Mariners are cautioned to stay well inside the north and south entrance channels.

(218) A highway bascule bridge with a clearance of 6 feet crosses the channel about 0.6 mile above the entrance; the bridge is maintained in the closed position. An overhead power cable 500 feet north of the bridge has a clearance of 64 feet; overhead power and telephone cables just south of the bridge have a clearance of 30 feet.

(219) Berths, gasoline, diesel fuel, ice, and some marine supplies are available on the west side of Delaware City Branch Channel at a marina 0.3 mile southwest of the northeast entrance. Hull and engine repairs can be made; a 25-ton mobile hoist is available.

(220) A privately dredged cut with a reported controlling depth at midchannel of 34 feet in August 1982, marked by a private **306°** lighted range and private buoys, extends northwestward through **Bulkhead Shoal Channel** from Delaware River main channel to the Enterprises Refinery terminal on the northwest side of Delaware City. The three offshore wharves at the terminal have a combined berthing area of 2,850 feet with dolphins. In 1984 depths of 28-38 feet were reported alongside; deck height, 15 feet. The storage capacity at the terminal is 8.8 million barrels. Water is available on the wharves.

(221) The current velocity is 2.1 knots between Pea Patch Island and Delaware City.

(222) An overhead power cable with a clearance of 223 feet crosses the river about 1.5 miles above **Fort Delaware Light 5N** (39°35.4'N., 75°33.9'W.). The power cable support tower, on the west side of the channel, has a private fog signal and a racon.

(223) **New Castle,** Mile 57W, has little waterborne commerce. The principal public wharf was in ruins in 1983. Several stone fenders that stand about 5 feet above high water protect the wharves from drifting ice. A 40-foot marine railway, 0.4 mile north-northeast of the public wharf, can handle boats for emergency repairs at high water.

(224) **Pennsville,** Mile 58E, has a small marina with an 8-ton mobile hoist; minor repairs can be made.

(225) A submerged jetty, marked by seasonal buoys, is in **Travis Cove** at about Mile 58.7E.

(226) **Delaware Memorial Bridge,** Mile 60, has twin suspension spans over the main channel with a clearance of 188 feet for the middle 800 feet.

(227) **Salem Canal,** at the east end of the bridges, once gave access to the upper part of Salem River. The route is now blocked in several places, the first being at a dam about 300 yards above the mouth.

(228) **Deepwater Point,** 0.6 mile above the New Jersey end of the Memorial Bridge, is the site of the E.I. duPont de Nemours and Co., Chambers Works Main Wharf. The 550-foot offshore wharf (39°41'37"N., 75°30'39"W.) provides 715 feet of berthing space. Depths of 33 feet are reported alongside with a deck height of 10½ feet. Acids and organic chemicals are handled at the wharf with a rail connection to the rear.

(229) **Pigeon Point,** Mile 60.5W, has a railroad car-float bridge. Railroad cars are barged to Deepwater Point and Thompson Point.

(230) **Christina River,** Mile 61.5W, is the approach to the city of Wilmington and to the towns of Newport and Christiana.

(231) **Channels.–**A Federal project provides for a 35-foot channel from Delaware River to Lobdell Canal and a turning basin of the same depth opposite the Wilmington Marine Terminal. The channel is subject to frequent shoaling. (See Notice to Mariners and the latest editions of the charts for controlling depths.) A steel sheet-pile jetty, 0.4 mile long and marked at its outer end by a light, is on the south side of the entrance. The channel is marked by a **293°** lighted range and by a lighted bell buoy on the north side of the entrance.

(232) Above Lobdell Canal, the controlling centerline depths in Christina River, in July 1997, were 11 feet to the Market Street bascule bridge, about 2.8 miles above the mouth, thence in 1960, 5½ feet to the bascule bridge at Newport. Above this point local knowledge is necessary to carry the best water.

(233) **Port of Wilmington, Marine Terminal Wharf, Berths 1-7** (39°43' 06"N., 75°31'25"W.): 3,435-foot face and berthing space, 35-38 feet alongside; deck height, 12 feet; 46,400 square feet covered storage area; two steel storage tanks with a capacity of 3 million gallons; rail and highway connections; receipt and shipment of general cargo and automobiles; receipt of dry bulk commodities, including gypsum rock, and of fruit, wood pulp, lumber, and miscellaneous chemicals; owned by Diamond State Port Corp., and operated by Port of Wilmington.

(234) **Port of Wilmington, Marine Terminal Floating Berth** (39°43'01"N., 75°31'05"W.): offshore wharf with 515-foot face and berthing space, 35 feet alongside; one refrigerated storage tank with a capacity of 6 million gallons; rail and highway connections; receipt and shipment of orange juice concentrate and automobiles; owned by Diamond State Port Corp., and operated by Port of Wilmington.

(235) **Delaware Terminal Co., Port of Wilmington, Marine Terminal Tanker Berth** (39°42'58"N., 75°30'51"W.) is owned by the U.S. Government and operated by Delaware Terminal Co., Inc. The wharf has a 50-foot face and can accommodate vessels up to 1,000 feet with dolphins. Depths of 38 feet are reported alongside; deck height, 12 feet. Petroleum products are handled at the berth.

(236) **Lobdell Canal,** on the south side of Christina River 0.9 mile above the mouth, is not used.

(237) **Brandywine Creek,** on the northeast side of Christina River 1.6 miles above the mouth, has depths of about 4 feet to the railroad bridge 1 mile above its mouth. The channel is rocky above the railroad bridge, but depths of 1 to 2 feet can be carried 0.7 mile to Market Street bridge, above which there are rapids. The river is used mostly for anchorage and storage of pleasure boats.

(238) An overhead power cable about 0.1 mile above the mouth has a clearance of 59 feet.

(239) The railroad bridge about 1 mile above the mouth of Brandywine Creek and the highway bridges above it have fixed spans with a minimum width of 40 feet and a clearance of 10 feet. The overhead power cable 300 yards above the railroad bridge has a clearance of 34 feet.

(240) **Wilmington,** on the north side of Christina River 2.5 miles above the mouth, has large manufacturing interests. Both sides of the river at the city are lined with wharves which support a large traffic in barges. The deepwater facilities, which were described earlier, are on the south side of the river just inside the entrance. For a complete description of the port facilities at Wilmington refer to Port Series No. 8, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(241) **Newport,** on the north side 6.8 miles above the mouth, is at the head of practical navigation.

(242) **Anchorages.–**Vessels must not anchor in Christina River channel within the city limits of Wilmington or tieup at any wharf more than two abreast without permission of the harbor commissioners. A general anchorage is off Deepwater Point, south of the river entrance. (See **110.1 and 110.157 (a)(7) and (b),** chapter 2, for limits and regulations, and page T–4 for **Wilmington climatological table.)**

(243) **Weather.–**Wilmington is in a region about midway between the rigorous climates of the North and the mild climates of the South and located at the head of the Delaware Bay.

(244) Rainfall distribution throughout the year is rather uniform with the spread between the wettest month (July) and the driest month (February) being only 1.42 inches (36.1 mm). The average annual precipitation for Wilmington is 41.48 inches (1054 mm). The greatest 24-hour rainfall occurred in July 1989 when 6.63 inches (168.4 mm) fell.

(245) Snowfall occurs on about 30 days per year on the average; however, an average of only 4 days annually produce snowfalls greater than 1.5 inches (38.1 mm). The average annual snowfall is 20.7 inches (525.8 mm). January is the snowiest month but it is trailed closely by February. The greatest 24-hour snowfall occurred in January 1996 when 22.0 inches (558.8 mm) fell.

(246) Glaze or freezing rain occurs on an average of only once per year, generally in January or February. However, some occurrences have been noted in November and December. Some years pass without the occurrence of freezing rain, while in others it occurs on as many as 8 to 10 days.

(247) Since 1950, eight tropical storms have influenced the Wilmington area and the direction of approach has always been from the south through southwest. Fortunately, all have been in the dissipation stage and no hurricane damage has been noted.

(248) In summer, the area is under the influence of the large semipermanent high-pressure system commonly known as the Bermuda High. Based on climatology, it is usually centered over the Atlantic Ocean near latitude 30°N. This high-pressure system brings a circulation of warm, humid air masses over the area from the deep South. The proximity of large water areas and the inflow of southerly winds contribute to high relative humidities during much of the year.

(249) January is the coldest month, and July, the warmest. The average annual temperature at Wilmington is 54.5°F (12.5°C) with an average high of 63.8°F (17.7°C) and an average low of 44.8°F (7.1°C). The warmest temperature on record at Wilmington is 102°F (38.9°C) last recorded on July 3rd and 4th, 1966. The coldest temperature on record is -14°F (-25.6°C) last recorded in January 1985. Each month, October through May, has recorded temperatures below freezing (0°C) while each month, June through September, has seen temperatures in excess of 100°F (37.8°C).

(250) **Bridges.–**There are no bridges or overhead power cables over the deepwater section of Christina River. From Lobdell Canal to just above the bridge at Newport, 6.8 miles above the mouth, the least clearance of drawbridges is 2 feet and fixed bridges, 22 feet. (See **117.1 through 117.59 and 117.237,** chapter 2, for drawbridge regulations.) The least clearance of overhead power cables is 42 feet.

(251) In 1984, partially submerged concrete structures of a former bridge were reported about 4.9 miles above the mouth of the river near Interstate 95 fixed bridge; caution is advised.

(252) **Tides and currents.–**The mean range of tide is 5.7 feet at Wilmington. The current velocity is about 0.8 knot.

(253) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(254) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) Vessels subject to boarding for quarantine inspection are required to anchor off Marcus Hook boarding station, 7 miles up the Delaware River from Wilmington.

(255) Wilmington is a **customs port of entry.**

(256) **Harbor regulations.–**The speed of vessels in Christina River is limited to 8 miles per hour. (See **162.35,** chapter 2.)

(257) **Supplies.–**Water can be supplied at the Wilmington Marine Terminal from the city mains. The nearest facilities for supplying deep-draft vessels with bunker oil are at Marcus Hook. Light-draft vessels can obtain fuel at a wharf on the south side of Christina River just above the second bridge; the depth at the wharf is about 8 feet. Small craft can obtain gasoline and supplies at Wilmington near the second bridge over Christina River.

(258) **Repairs** can be made to light-draft vessels and small craft at the boatyards near the second bridge on Christina River; largest marine railway, 110 feet. Small-craft repairs can also be made at a boatyard above the second bridge on Brandywine Creek.

(259) **Communications.–**Railroad passenger service (Amtrak) is available at the Wilmington station 5 miles from the port. The local airport is the New Castle County Airport (formerly the Greater Wilmington Airport), 5 miles southwest of Wilmington; no regular scheduled passenger service is available. The nearest airport with regular scheduled passenger service is Philadelphia International Airport, 22 miles northeast of Wilmington.

(260) **Chart 12312.–Carneys Point** (39°42.9'N., 75°29.1'W.), Mile 61.8E, is across the Delaware River from Christina River.

(261) **Speed.–**The Corps of Engineers has requested that masters limit the speed of their vessel when passing wharves and piers so as to avoid damage by suction or wave wash to property or persons.

(262) **Edgemoor** is at Mile 63W. The wharves of the E.I. duPont de Nemours Co., Edgemoor Plant, have depths of 20 feet reported at their outer ends.

(263) A dike with its outer end submerged extends 0.3 mile offshore from **Oldmans Point,** on the eastern shore of Delaware River 2 miles above Edgemoor. About 0.3 mile southward of the dike are the ruins of a long pier.

(264) **Local magnetic disturbance.–**Differences of 2° to 5° from normal variation have been observed astride the Delaware River Channel from Oldmans Point to the mouth of Oldmans Creek.

(265) **Oldmans Creek,** Mile 66E, has an unmarked channel leading from the Delaware River to the mouth of the creek. In 1973, extensive shoaling was reported at the entrance to and throughout Oldmans Creek. Mariners should exercise extreme caution when transiting this area. The mean range of tide is 5.6 feet at Oldmans Point.

(266) A vertical-lift bridge and two swing bridges cross the creek between the mouth and **Pedricktown,** about 3.6 miles above the mouth; all are kept in a closed position. (See **117.737,** chapter 2, for drawbridge regulations.) The limiting clearance of the bridges is 1 foot at the second bridge, and the minimum width is 36 feet at the second bridge. In November 1979, the swing span of the second bridge was being replaced with a removable span. The design clearances of the new span are 3 feet vertical and 14 feet horizontal.

(267) **Marcus Hook,** Mile 69N, is an important petroleum center where large quantities of crude oil are received and refined petroleum products are shipped. Vessels can be bunkered at the rate of 1,500 to 5,000 barrels per hour and the companies also operate barges for bunkering in the stream or alongside other wharves.

(268) A Government wharf at Marcus Hook has a depth of 14 feet at the outer end.

(269) On the southeast side of the main ship channel opposite Marcus Hook is a **general anchorage** with a preferential area for vessels awaiting quarantine inspection. (See **110.1 and 110.157 (a) (8) and (b),** chapter 2, for limits and regulations.) The mean range of tide is 5.6 feet at Marcus Hook. The current velocity is about 1.7 knots.

(270) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(271) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(272) **Wharves.–**There are deep-draft wharves and piers along the Delaware River at Marcus Hook, Pa., and adjacent Claymont, Del. All have direct highway and railroad connections and water and electrical shore power. The alongside depths are reported depths. (For information on the latest depths contact the operator.) Only deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 8, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(273) **Oceanport Industries Pier** (39°48'06"N., 75°25'59"W.): 36-foot face, 36 feet alongside; deck height, 16 feet; 500,000-barrel storage capacity; receipt of dry bulk commodities; owned and operated by Oceanport Industries, Inc.

(274) **General Chemical Corp., Delaware Works Upper Pier** (39°48'09"N., 75°25'51"W.): lower side 744 feet long; 18-30 feet alongside; deck height, 12 feet; upper side 747 feet long; 18-30 feet alongside; deck height, 12 feet; storage tanks to 1,042,000 gallons; shipment of sulfuric acid; owned and operated by General Chemical Corp.

(275) **Sun Refining and Marketing Co., Marcus Hook Wharf No. 3C** (39°48'22"N., 75°25'18"W.): face 120 feet long, 1,000 feet of berthing space; 39 feet alongside; deck height, 15 feet; 14¼-million-barrel storage capacity; receipt and shipment of petroleum products, liquified petroleum gas, and petrochemicals; receipt of crude oil, bunkering vessels; owned and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc.

(276) **Sun Refining and Marketing Co., Marcus Hook Wharf Nos. 3A and 3B** (39°48'26"N., 75°25'05"W.): face 71 feet long, 1,000 feet of berthing space; 38 feet alongside; deck height, 15 feet; receipt and shipment of petroleum products, petrochemicals, and liquified petroleum gas, receipt of crude oil, bunkering vessels; owned and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc.

(277) **Sun Refining and Marketing Co., Marcus Hook Wharf Nos. 2 and 2C** (39°48'30"N., 75°24'56"W.): wharf face 90 feet long, 650 feet of berthing space; 38 feet alongside; upper side 500 feet long, 440 feet of berthing space; 20 to 38 feet alongside; deck height, 15 feet; receipt and shipment of petroleum products, receipt of crude oil, shipment of petrochemicals, and bunkering vessels; owned and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc.

(278) **Sun Refining and Marketing Co., Marcus Hook Wharf, Nos. 1, 1B, and 1C** (39°48'35"N., 75°24'47"W.): wharf face 80 feet long, 600 feet of berthing space; 20 feet alongside; lower side 500 feet long, 470 feet of berthing space, 20 feet alongside; upper side 470 feet long, 20 feet alongside; deck height, 15 feet; receipt and shipment of petroleum products, and bunkering vessels, receipt of crude oil; owned and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc. and Hays Tug and Launch Service Inc.

(279) **Tosco Refining Co., Marcus Hook Wharf, Dock Nos. 1 and 2** (39°48'47"N., 75°24'27"W.): offshore wharf, upper and lower sections connected by a steel catwalk provide 1,400 feet of berthing space with dolphins, 40 feet alongside; deck height, 10½ feet; storage capacity 3½ million barrels; receipt and shipment of petroleum products, receipt of crude oil; owned and operated by Tosco Refining Co.

(280) **Tosco Refining Co., Marcus Hook Barge Wharf** (39°48'50"N., 75°24'18"W.): 500-foot face, 34 feet alongside; rear of face 480 feet, 20 feet alongside; deck height, 14 feet; receipt and shipment of petroleum products, receipt of crude oil; owned and operated by Tosco Refining Co.

(281) **Raccoon Creek,** Mile 70S, is the approach to the towns of Bridgeport and Swedesboro. The creek carries some traffic in fertilizer and fertilizer materials. The approach to Raccoon Creek is a dredged channel that extends west-southwestward through the shallow flats for 1.1 miles from the mouth. In 1993, the controlling depths were 4½ feet in the entrance channel, thence 3 feet on the centerline to Bridgeport, and thence 1 foot on the centerline to Swedesboro.

(282) The approach channel is marked by buoys, and a light marks the outer end of the rock jetty on the south side of the entrance.

(283) The U.S. Route 130 highway bridge at **Bridgeport,** 1.5 miles above the mouth, has a vertical-lift span with clearance of 4 feet down and 64 feet up. The ConRail bridge, 0.3 mile above the highway bridge, has a swing span with a width of 38 feet and a clearance of 7 feet. (See **117.1 through 117.59 and 117.741,** chapter 2, for drawbridge regulations.) Gasoline and minor repairs are available at a small marina on the north bank 1 mile below the highway bridge.

(284) Between Bridgeport and **Swedesboro,** 7.1 miles above the mouth, the least bridge clearances are: swing bridge, 50 feet horizontal, 6 feet vertical; fixed bridges, 33 feet horizontal, 8 feet vertical. Overhead power cables crossing the creek between the mouth and Swedesboro have a least clearance of 64 feet.

(285) An overhead power cable across Delaware River at Mile 70.5, near the northeast end of Marcus Hook Range, has a clearance of 210 feet.

(286) The **Commodore John Barry Bridge,** a fixed highway bridge with a clearance of 181 feet for a width of 1,600 feet over the main channel and 190 feet at the center, crosses the Delaware River between Chester and Bridgeport at Mile 71.

(287) **Chester,** Mile 72N, is an important manufacturing center, and many of its industries use the wharf facilities along the 3-mile waterfront. The nearest designated anchorage is off Marcus Hook.

(288) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(289) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(290) Chester is a **customs port of entry.**

(291) Waterborne traffic to the wharves and piers in Chester consists mainly of barge traffic and light-draft vessels. The wharves have depths of 15 to 20 feet alongside; and some have as little as 5 feet. There are storage facilities and mechanical transfer equipment, and most have rail and highway connections. Water is piped to most facilities.

(292) **Chester Creek** empties into Delaware River about at the midpoint of the city waterfront. The railroad bridge just above the mouth has a swing span with a clearance of 1½ feet. (See **117.1 through 117.59 and 117.901,** chapter 2, for drawbridge regulations.)

(293) Above that point, navigation is restricted by the 6-foot minimum clearance of the fixed bridges. Navigation is suitable only for very shallow-draft boats to the second bridge, about 0.2 mile above the entrance. The mean range of tide is 5.7 feet in the entrance.

(294) The current velocity is 1.7 knots on the flood and 2.2 knots on the ebb off **Eddystone,** Mile 73N.

(295) **Darby Creek,** Mile 74N, was reported to be shoaled to an unknown extent in the entrance in August 1980. The railroad bridges, 0.3 mile above the mouth, have bascule spans with minimum clearances of 3 feet. (See **117.1 through 117.59 and 117.903,** chapter 2, for drawbridge regulations.) The fixed highway bridge just above the railroad bridges has a clearance of 22 feet. Another fixed highway bridge with a clearance of 22 feet is 0.6 mile above the mouth of Darby Creek. Parallel fixed highway bridges, 1.2 miles above the mouth, have a least clearance of 4 feet. Oil barges and small tankers go to the wharf with about 7 feet alongside just below the railroad bridges; above this point, the creek is used only by small pleasure craft. The overhead power cable, 3.7 miles above the mouth of the creek, has a clearance of 29 feet. Submerged piles, marked at the outer end by a 55-gallon drum, extend about 150 yards south-southeast from the west side of the entrance.

(296) **Essington,** Mile 75N, has several boatyards that can provide berths, fuel, and supplies. Major hull and minor engine repairs to small craft can be made. Maximum haul-out capacities; marine railways, 50 feet; mobile lifts, 20 tons. Between Essington and Delaware River main channel is marshy **Little Tinicum Island,** which is about 2 miles long. There is a dike along the north shore of the passage east and north of Little Tinicum Island. An unmarked channel parallel to and about 450 feet from the centerline of the dike has a controlling depth of about 5½ feet; shoals are on both sides of the channel. Local vessels usually pass around the west end of the island where the controlling depth is about 9 feet.

(297) A **special anchorage** is between the Essington waterfront and Little Tinicum Island. (See **110.1** and **110.67,** chapter 2, for limits and regulations.) Depths are 9 to 20 feet in the anchorage. The current velocity is about 1.3 knots. In 1978, a piling was reported in the anchorage area, about 0.5 mile eastward of the entrance to Darby Creek.

(298) Gasoline, diesel fuel, water, ice, berths, and marine supplies are available along the Essington waterfront eastward of Darby Creek. Maximum haul-out capacities are: railway, 125 feet; lift, 15 tons.

(299) A railroad car-float bridge is on **Thompson Point** on the New Jersey side opposite the west end of Little Tinicum Island. Between Thompson Point and **Crab Point,** 0.5 mile to the eastward, are the large buildings of the E.I. duPont de Nemours and Co., Repauno Plant. The plant has two wharves which provide 1,440 feet of berthing space with depths of 3 to 35 feet reported alongside; deck height is 10 feet. There are water and electrical shore-power connections and rail and highway connections. It is used for receipt and shipment of sulfuric acid and anhydrous ammonia.

(300) A **general anchorage** is between Thompson Point and Crab Point, and the south side of the main channel. (See **110.1 and 110.157 (a)(9) and (b),** chapter 2, for limits and regulations.) The current velocity is about 2 knots a half-mile east of Crab Point.

(301) There are several large petroleum facilities at **Paulsboro,** Mile 77S. All have railroad and highway connections and freshwater, only the GATX Wharf has electrical shore-power connections.

(302) **Mobil Oil Corp., Paulsboro Refinery, Tug Wharf and Berths 1, 2A, 2, 2B, 3A, 3B, and 5** (39°50'46"N., 75°15'55"W.): on Bramell Point, at the west end of the Paulsboro waterfront; 2,389-foot marginal wharf providing 2,256 feet of berthing space; 34 feet alongside; deck height 12½ feet; 6-million-barrel storage capacity; used for the receipt of crude oil, petroleum products, and sodium silicate, and shipment of bulk and packaged petroleum products, bunkering vessels; owned and operated by Mobil Oil Corp.

(303) **Mobile Oil Corp., Paulsboro Refinery Tanker Wharf** (39°50'44"N., 75°16'12"W.): face 115 feet, 775 feet of total berthing space; 40 feet alongside; deck height, 12½ feet; receipt of petroleum products, crude oil, bunkering of vessels; owned and operated by Mobil Oil Corp.

(304) **GATX Terminals Corp., Paulsboro Terminal Wharf** (39°51'00"N., 75°15'00"W.): offshore wharf which provides 900 feet of berthing space; 36 to 40 feet alongside; deck height, 13 feet; 1.6-million barrel storage capacity; receipt and shipment of petroleum products; owned and operated by GATX Terminals Corp.

(305) **Mantua Creek,** Mile 78S, passes on the east side of Paulsboro and meanders southeastward to the vicinity of **Mantua,** 7.6 miles above the mouth. There is waterborne traffic in chemicals and paper to the first bridge; above which the creek is used only by small boats.

(306) The Mantua Creek entrance jetties are marked by lights, and the entrance channel is marked by buoys. In August 1998, the centerline controlling depth in the dredged channel was 11 feet for about 0.7 mile above the mouth; thence in 1981, 7 feet to **Friars Landing,** about 2.3 miles above the mouth, thence 4½ feet to **Parkers Landing,** about 4.5 miles above the mouth, and thence less than 1 foot to Mantua. The mean range of tide is 5.7 feet in the entrance.

(307) The ConRail bridge 1.3 miles above the mouth has a 32-foot-wide swing span with a clearance of 1 foot. State Route 44 highway bridge, 1.5 miles above the mouth, has a vertical-lift span with clearance of 5 feet down and 64 feet up. (See **117.1 through 117.59 and 117.729,** chapter 2, for drawbridge regulations.) Above this point, the fixed bridges and overhead cables have minimum clearances of 10 feet and 50 feet, respectively.

(308) The wharves below the first bridge on Mantua Creek have depths of 20 to 14 feet alongside.

(309) A **general anchorage** is on the southeasterly side of the main channel above the entrance to Mantua Creek. (See **110.1 and 110.157 (a) (10) and (b),** chapter 2, for limits and regulations.) The current velocity is about 2 knots in the channel opposite the anchorage.

(310) On the northeast side of the Delaware River at Mile 78N, there are two petroleum terminals both of which have railroad and highway connections and water.

(311) **Sun Refining and Marketing Co., Hog Island Wharf** (39°51'38"N., 75°14'19"W.) provides 2,754 feet of berthing space; 34 to 39 feet reported alongside; deck height, 16 feet; 2¾ million-barrel storage capacity; receipt of crude oil and methyl tertiary butyl; owned by the City of Philadelphia and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc.

(312) **Citgo Asphalt Refining Co., Paulsboro Terminal Main Wharf** (39°51'15"N., 75°13'42"W.): 40-foot face providing 1,000 feet of berthing space with mooring dolphins, 40 feet alongside; deck height, 10 feet; pipelines extend from wharf to six steel storage tanks with a capacity of 1 1/3 million barrels; receipt of crude oil and shipment of asphalt; owned and operated by Citgo Asphalt Refining Co.

(313) **Sun Pipe Line Co., Fort Mifflin Terminal Wharf, Berth A** (39°52'08"N., 75°13'07"W.) **and Berth B** (39°52'13"N., 75°13'01"W.): 1,845 feet of berthing space; 40 and 42 feet alongside; deck height, 15 feet; 440,000-barrel storage capacity; receipt of petroleum products and crude oil; bunkering of vessels; owned and operated by Sun Pipe Line Co., a subsidiary of Sun Oil Co. Inc.

(314) Old **Fort Mifflin,** Mile 79.5N, is the site of the Corps of Engineers wharves, which have depths of 10 to 30 feet at their outer ends.

(315) **Woodbury Creek,** Mile 79.5S, is used only by small craft; local knowledge is needed. The approach must be made from the west-southwest because of the 2-foot shoal directly off the creek. At low water the channel within the creek is well defined. In July 1981, the controlling depth was 6 feet to the first bridge; thence in 1965, reported depths of 6 to 3 feet were available to the second bridge, about 1.5 miles above the mouth; thence depths of less than 1 foot to Woodbury, 2.7 miles above the mouth. The mean range of tide is 5.7 feet in the entrance. The highway bridge 0.8 mile above the mouth has a fixed span with a clearance of 15 feet. An overhead power cable close westward of the bridge has a clearance of 35 feet. Above this point, fixed bridges and overhead cables have a minimum clearance of 4 feet and 45 feet, respectively.

(316) **Chart 12313.–Philadelphia,** one of the chief ports of the United States, is at the junction of Delaware and Schuylkill Rivers. The midharbor point along Delaware River is at Chestnut Street, Mile 86.5W.

(317) The Port of Philadelphia, as defined for Customs purposes, comprises such waters of the Delaware and Schuylkill Rivers bordering on the municipality as are navigable; the municipal limits on Delaware River extend from Fort Mifflin on the south to Poquessing Creek on the north, a distance of about 20 miles.

(318) Large quantities of general cargo are handled at the port in both foreign and domestic trade. In addition, crude petroleum and petroleum products, sugar, and ore are imported, while coal, grain, and refined petroleum products are exported. Coastwise receipts are mostly crude petroleum and petroleum products, and shipments consist chiefly of refined petroleum products.

(319) **Channels.–**A Federal project provides for a channel 40 feet deep from the sea through the main channel in Delaware Bay and River to the Philadelphia Naval Shipyard, Mile 81; thence 40 feet on the west side and 37 feet on the east side through Philadelphia Harbor to Allegheny Avenue, Mile 89; thence 40 feet to the U.S. Steel basin opposite Newbold Island, Mile 110; and thence dredging depths of 25 feet to the Trenton Marine Terminal, Mile 115. (See Notice to Mariners and the latest editions of the charts for controlling depths.)

(320) **Note.–**In the Philadelphia-Trenton section of the river, masters are especially requested to limit speed of their vessels when passing wharves and piers so as to avoid damage by suction or wave wash to property or persons.

(321) **Anchorages.**–General and naval anchorages are at Philadelphia. (See **110.1 and 110.157,** chapter 2, for limits and regulations.)

(322) **Bridges.–Walt Whitman Bridge,** Mile 84, a highway suspension bridge connecting Philadelphia with Gloucester City, has a clearance of 150 feet at the center of the main span, and minimum clearance of 139 feet under the full width of the main span. **Benjamin Franklin Bridge,** Mile 86.8, 0.3 mile above Chestnut Street, has a suspension span with a clearance of 135 feet for the middle 800 feet of the span and 128 feet under the rest of the span. However, Benjamin Franklin Bridge has movable maintenance walkways, when in use, the vertical clearances are reduced to 121 feet under the middle 800 feet of the span and 114 feet under the rest of the river channel span.

(323) **Tides.–**The mean range of tide is about 5.9 feet at Philadelphia. (See the Tide Tables for daily predictions.)

(324) **Towage.–**A large fleet of tugs up to 3,300 hp is available at Philadelphia, day and night, for any type service required. As a general rule, tugs are not required for vessels moving between Philadelphia and the sea; most vessels traverse this distance under their own power.

(325) **Weather.–**The proximity of Philadelphia to Delaware Bay probably has some effects on temperature conditions locally. Periods of extended cold weather are relatively rare, with below zero readings reported only 24 times since official records began. Sustained periods of very high or low temperatures seldom last more than 3 or 4 days as conditions change fairly rapidly. Due to the prevalence of maritime air during the summer months, the humidity adds to the discomfort of the high temperatures. Fog can be expected during the autumn and winter.

(326) The average annual temperature at Philadelphia is 55.1°F (12.8°C). The average annual extremes are 63.9°F (17.7°C) and 45.7°F (7.6°C). July is the warmest month with an average temperature of 77.4°F (25.2°C) while January is the coldest month with an average temperature of 32.1°F (0°C). The warmest temperature on record is 104°F (40°C) recorded in July 1966 and the coldest temperature on record is -7°F (-21.7°C), last recorded in January 1984. Each month, June through September has recorded temperatures at or above 100°F (37.8°C) while each month, October through May has recorded temperatures below freezing (0°C).

(327) Precipitation is fairly evenly distributed throughout the year with maximum amounts during mid-summer. Much of the summer rainfall is in connection with local thunderstorms. July is the wettest month averaging 4.77 inches (121 mm) and October is the driest month averaging 2.69 inches (68 mmm). The greatest 24-hour rainfall occurred in August 1971; 4.77 inches (121 mm). The average annual snowfall for Philadelphia is 20.7 inches (526 mm) and snow has fallen in each month, October through May. Single snow storms of 10 inches (254 mm) or more occur about every 5 years. The greatest 24-hour snowfall occurred in February 1983; 21.1 inches (536 mm).

(328) The prevailing wind direction for the summer is from the southwest, while northwesterly winds prevail during the winter. The annual prevailing direction is from the west-southwest. Destructive velocities are comparatively rare and occur mostly in gusts during summer thunderstorms. High winds in the winter, as a rule, come with the advance of cold air after the passage of a deep low-pressure area. Only rarely have hurricanes in the vicinity caused widespread damage, then primarily through flooding. Since 1950, seven storms have come within 57.8 miles (93 km) of Philadelphia, all from the south or southwest.

(329) Flood stages in the Schuylkill River normally occur about twice a year. Flood stages seldom last over 12 hours and usually occur after excessive falls of precipitation during summer thunderstorms. Flood stages in the Delaware River are caused by abnormally high tides due to the water "backing up" under the influence of strong south or southeast winds.

(330) The office of the National Weather Service is at the Philadelphia International Airport at the southwestern end of the city. **Barometers** may be compared there or checked by telephone. (See page T–5 for **Philadelphia climatological table.**)

(331) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(332) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) Vessels subject to boarding for quarantine inspection are required to anchor off Marcus Hook boarding station. (See **110.1 and 110.157 (a) (8), and (b),** chapter 2, for quarantine anchorage regulations and limits.)

(333) Philadelphia is a **customs port of entry.**

(334) Coast Guard.–A **Marine Safety Office** is in Philadelphia. (See appendix for address.)

(335) **Harbor regulations.–**Local rules and regulations are enforced by the Navigation Commission for the Delaware River (Pennsylvania). The authority of the Commission extends from the Pennsylvania-Delaware boundary line on the south to the head of the navigable waters of Delaware River on the north. Copies of the regulations may be obtained from the Navigation Commission for the Delaware River (Pennsylvania), 1400 W. Spring Garden Street, Philadelphia, Pa. 19130.

(336) **Wharves.–**Philadelphia has more than 45 deep-water piers and wharves along its Delaware River waterfront and along Schuylkill River. Most of the piers and wharves have highway and railroad connections. The port is served by three rail lines: Transportation Inc., Conrail, and CP Rail System. Each of these carriers connect with tracks of the Philadelphia Belt Line Railroad which extends along the main part of the port's Delaware River waterfront. Freshwater is piped to most piers and wharves; electrical shore-power connections, if available, are mentioned under the particular facility.

(337) The Schuylkill River wharves and piers are mostly used to handle bulk petroleum products. Most of the general cargo piers and wharves are between the Walt Whitman Bridge and Port Richmond, 2 miles above the Benjamin Franklin Bridge, and at Ten Mile Point, 7 miles above the Benjamin Franklin Bridge.

(338) Coal, fertilizer, and ore are handled at the facilities south of Greenwich Point, just below the Walt Whitman Bridge.

(339) Cargo is generally handled by ships' tackle; special handling equipment, if available, is mentioned in the description of the particular facility. A barge crane with an 800-ton capacity is available by special arrangement; a 375-ton crane is also available.

(340) The alongside depths for each facility are reported. (For information on the latest depths contact the Port of Philadelphia or the private operator.) Only the major deep-draft facilities are described. For a complete description of the port facilities refer to

Port Series No. 8, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(341) **Facilities in Schuylkill River, East Bank:**

(342) **Creedon Tug and Barge Works, Girard Point, Pier No. 1** (39°53'38"N., 75°11'49"W.): upper side 1,092 feet long; 31 feet alongside; deck height, 11 feet; two 35-ton gantry cranes; 3 acres of open storage; mooring barges for cleaning, and vessels for repair; owned by Harry Hays Tug and Towing Service Inc. and operated by Creedon Tug and Barge Works and Creedon's Terminal.

(343) **Sun Refining and Marketing Co., Philadelphia Refinery, Girard Point Plant, Wharves 1, 2 and 3**: about 0.2 mile above Interstate 95 bridge; 2,075 feet of berthing space; 32 feet alongside; deck height, 12 feet; pipelines extend from wharf to steel storage tanks with a capacity of 1.6 million barrels; receipt and shipment of petroleum products, cumene, and benzene; owned and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc.

(344) **Sun Refining and Marketing Co., Philadelphia Refinery, Point Breeze Plant, Case Dock, Short Pier, and DeLoach Dock Wharf** (39°55'02"N., 75°12'08"W.): 1,650-foot face with 1,775 feet of berthing space; 30 feet alongside; deck heights, 12 to 17 feet; pipelines extend from wharf to steel storage tanks with a capacity of 952,000 barrels; shipment of petroleum products; owned and operated by Sun Refining and Marketing Co., a subsidiary of Sun Oil Co. Inc.

(345) **Facilities in Schuylkill River, West Bank:**

(346) **Louis Dreyfus Energy, North America, Philadelphia Wharf** (39°55'38"N., 75°12'46"W.): 206-foot face; 16 feet alongside; deck height, 9 feet; pipelines extend from wharf to steel storage tanks with a capacity of 850,000 barrels; receipt and shipment of petroleum products; owned and operated by Louis Dreyfus Energy, North America.

(347) **C.R. Wamer, Yankee Point Terminal Mooring** 39°54'41"N., 75°12'37"W.): 195-foot face; 24 to 26 feet alongside, deck height, 6 feet; pipelines extend from barge to steel storage tanks with a capacity of 135,000 barrels; receipt and occasional shipment of petroleum products; owned and operated by C.R. Wamer Inc.

(348) **Maritank Philadelphia Wharf** (39°54'36"N., 75°12'58"W.): 750-foot face; 33 feet alongside; deck height, 12 feet; pipelines extend from berth to steel storage tanks with a capacity of 947,300 barrels; receipt and shipment of petroleum products; owned and operated by Maritank Philadelphia Inc.

(349) **Facilities in Delaware River, south of Benjamin Franklin Bridge** (39°57'10"N., 75°08'07"W.):

(350) **Greenwich Ore Pier 122S, South Wharves** (39°53'47"N., 75°08'16"W.): south side 850 feet long, 40 feet alongside; north side 850 feet long, 20 feet alongside; deck height, 12 feet; four cranes, unloading rate 1,200 tons per hour; electric conveyor and hopper system; 2-million-ton iron ore open storage; receipt of ore; owned by ConRail and operated by Pennsylvania Tidewater Dock Co.

(351) **Packer Ave. Marine Terminal Wharf** (39°54'08"N., 75°08'03"W.): 3,101-foot face with 3,150 feet of berthing space; 40 feet alongside; deck height, 13 feet; 100,000 square feet heated covered storage and 90,000 square feet covered cold-storage; one 375-ton crane; lift capacity; forklift trucks; receipt and shipment of conventional, containerized and roll-on/roll-off general cargo including fruit and steel; electrical shore-power connections; owned by Philadelphia Regional Port Authority and operated by Holt Cargo Systems Inc.

(352) **Pier 96S, South Wharves** (39°54°45"N., 75°07°56"W.): south side 1,320 feet long, north side 1,220 feet long, 30 feet alongside; deck height, 14 feet; 3 acres open storage; electric and water connections; receipt and shipment of automobiles; owned by Philadelphia Regional Port Authority and operated by Pasha Auto Warehousing and Pasha Terminal Co.

(353) **Pier 82S, South Wharves** (39°55'03"N., 75°08'03"W.): 45-foot face; deck height 11.7 feet; south side 852 feet long, deck height, 7.7 feet; north side 1,155 feet long, deck height, 11.7 feet; 30 feet alongside; 75,000 square feet covered storage; receipt of fruit, vegetables, and other perishable commodities; shipment of paper products; owned by Philadelphia Regional Port Authority and operated by Horizon Stevedoring.

(354) **Pier 80S, South Wharves** (39°55'10"N., 75°08'12"W.): 358-foot face; south side 1,150 feet long; north side 1,063 feet long; 30 feet alongside; deck height, 11 feet; 254,024 square feet covered storage; 3 acres open storage; electric and water connections; receipt and shipment of newsprint, coated paper, wood pulp, lumber, and other forest products; owned by Philadelphia Regional Port Authority and operated by Penn Warehousing and Distribution Services Inc., and J.H. Stevedoring.

(355) **Facilities at Port Richmond:**

(356) **Tioga II Marine Terminal Wharf** (39°58'37"N., 75°05'40"W.): 736-foot face, 28 feet alongside; southwest side 626 feet long, (depth alongside unknown); northeast side 620 feet long, 32 feet alongside; deck height, 10.6 feet; two 1.5-ton electric cranes; electric and water connections; 130,000 square feet covered storage; 10 acres of open storage; pipelines extend from wharf to steel storage tanks with 1.2-million-barrel capacity; receipt and shipment of petroleum products, petrochemicals, and miscellaneous bulk liquids; owned by Philadelphia Regional Port Authority and operated by GATX Terminals Corp.

(357) **Tioga I Fruit Terminal Wharf** (39°58'42"N., 75°05'10"W.): 1,753-foot face, 670-foot lower side with roll-on/roll-off berth; 40 feet alongside; deck height, 12 feet; 397,500 square feet covered storage; forklift trucks to 10 tons, container lift trucks to 35 tons, one top-lift container truck to 40 tons; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo including fruit; owned and operated by Philadelphia Regional Port Authority.

(358) **Supplies.–**All types of marine supplies and services are available in the Philadelphia area. Bunker oil and diesel oil can be obtained at terminals along the Schuylkill River. Other bunkering terminals are at Marcus Hook, Paulsboro, and Eagle Point. Most larger vessels receive fuel from barges alongside.

(359) There are several shore-based firms engaged in the field of general ship repairs; work is done on the vessel or in the company shops. Repairs to small vessels can be made at shipyards on Cooper Point in Camden. Small-craft repair facilities are at Dredge Harbor, N.J., and Essington, Pa., described earlier in this chapter.

(360) **Communications.–**Philadelphia is served by three major railroad systems. More than 100 steamship lines operate to and from the port. Several major airlines provide frequent scheduled service between Philadelphia International Airport, 5.5 miles southwest of City Hall, and domestic and overseas points.

(361) **Schuylkill River,** Mile 80N, is navigable for 7.3 miles to **Fairmount Dam** and is an important outlet for a part of the commerce of Philadelphia.

(362) The Federal project provides for a channel 33 feet deep to Passyunk Avenue bridge, 3.1 miles above the mouth, thence 26 feet deep to Gibson Point, 4 miles above the mouth, and thence 22 feet deep to University Avenue bridge, 5.3 miles above the mouth. Above that point most of the wharves have depths of about 12 feet at their faces. (See Notice to Mariners and latest edition of the chart for controlling depths.)

(363) A light marks the outer end of a sunken jetty on the east side of the entrance to Schuylkill River and a fog signal is on the west side. A **021°30'** lighted range marks the entrance, and buoys mark the channel within the river as far as the railroad bridge, 4.5 miles above the mouth.

(364) Within its project limits, Schuylkill River is crossed by six bridges; the first two, Interstate 95 at Girard Point and the George C. Platt Memorial highway (Penrose Avenue) bridges, 0.6 mile and 1.3 miles, respectively, above the mouth, have fixed spans with clearances of 135 feet. The fixed highway bridge about 4.8 miles above the entrance has a clearance of 50 feet. The others, all drawbridges, have a minimum clearance of 15 feet. (See **117.1 through 117.59 and 117.905,** chapter 2, for drawbridge regulations.) The bridgetender of the railroad swing bridge, 4.3 miles above the mouth, monitors VHF-FM channel 13; call sign KXS–238.

(365) Above the University Avenue bridge, the limiting clearance of the fixed bridges is 16 feet. The railroad bridge, 5.6 miles above the mouth, has a swing span with a clearance of 26 feet. (See **117.1 through 117.59 and 117.905,** chapter 2, for drawbridge regulations.)

(366) The Passyunk Avenue bridge, 3.5 miles above the entrance has a bascule span with a clearance of 50 feet. (See **117.1 through 117.59 and 117.905(b)**, chapter 2, for drawbridge regulations.)

(367) The overhead cables above the University Avenue bridge have a minimum clearance of 70 feet.

(368) The mean range of tide is about 5.7 feet in Schuylkill River. The current velocity is about 0.5 knot in the entrance.

(369) The confluence of Schuylkill and Delaware Rivers is the center of the petroleum industry in the city of Philadelphia. The deep-draft piers and wharves along the river were described previously in this chapter under Wharves. Most of the other wharves and piers along the river have depths of 9 to 12 feet at their faces.

(370) **League Island,** now a part of the mainland at the junction of Delaware and Schuylkill Rivers, is the site of the **Philadelphia Naval Shipyard.** The reservation has a frontage of 0.6 mile on the east side of Schuylkill River and 2 miles on the north side of Delaware River. **Reserve Basin,** in the northwest part of the reservation, is used to store vessels of the reserve fleet. A ferry operates across Delaware River from midway along the League Island waterfront to National Park, N.J.

(371) **Coastal Eagle Point Oil Co., Berths 1A, 1, 2, and 3** (centered at 39°52'43"N., 75°09'20"W.), east of **Eagle Point,** Mile 81.8S: offshore wharves with up to 1,937 feet of berthing space; 40 to 43 feet alongside; deck height, 16 feet; railroad and highway connections; receipt of crude oil; receipt and shipment of petroleum products; bunkering of vessels; pipelines extending from wharves to storage tanks with a capacity of 8.6-million barrels; owned and operated by Coastal Eagle Point Oil Co.

(372) **Big Timber Creek,** Mile 82.9S (see also chart 12312), has a dredged entrance channel, which, in 1980, had a centerline controlling depth of 5 feet through the buoyed flats at the entrance, thence 7 feet at centerline to the fixed highway bridge at Westville, 1 mile above the mouth. In 1995, this project was reported to be authorized, yet no longer maintained. Local knowledge is needed to navigate the channel beyond the buoys. The minimum clearance of the fixed bridges at **Westville,** about 1 mile above the mouth, is 14 feet. Above Westville, the fixed bridges have a least vertical clearance of 8 feet. The overhead cables crossing the creek have a least clearance of 30 feet.

(373) The oil and chemical barge wharves on the northeast side of the entrance to Big Timber Creek have depths of about 12 feet at their faces. Above here, the creek is little used except by pleasure craft. Several marinas are along the creek; slips, gasoline, and some marine supplies are available. Hull and engine repairs can be made. Maximum haul-out capacities: railway, 48 feet; lift, 10 tons.

(374) **Gloucester City,** Mile 83.5, is the site of large manufacturing plants. The three deep-draft facilities along the waterfront, which are described below, have railroad and highway connections.

(375) **Koch Refining Co., Gloucester City Wharf** (39°53'41"N., 75°07'51"W.), about 0.7 mile below Walt Whitman Bridge: 50-foot face with 850 feet of berthing space; 35 feet alongside; deck height, 12 feet; pipelines from wharf to storage tanks with 800,400-barrel capacity; receipt and shipment of petroleum products; owned and operated by Koch Refining Co. L.P.

(376) **Holt Hauling and Warehousing Systems, Gloucester City Marine Terminal, Berths 9 and 9A** (39°54'04"N., 75°07'42"W.), about 1,000 feet south of Walt Whitman Bridge provide 1,530 feet of berthing space with 35 to 45 feet alongside; deck height, 12 feet; 125,000 square feet covered dry and refrigerated storage; 40 acres open storage; receipt and shipment of containerized general cargo; owned by Holt Cargo Systems Inc. and operated by Holt Hauling and Warehousing Systems Inc., Gloucester City Refrigerated Warehousing, and Gloucester City Terminals.

(377) **Holt Hauling and Warehousing Systems, Gloucester City Marine Terminal, Berth North 8A** (39°54'16"N., 75°07'38"W.), about 500 feet south of Walt Whitman Bridge provides 610 feet of berthing space with 40 feet alongside; deck height, 12 feet; 101,000 square feet covered dry storage and 20,000 square feet covered refrigerated storage; 40 acres open storage; receipt and shipment of conventional general cargo; owned by Holt Cargo Systems Inc. and operated by Holt Hauling and Warehousing Systems Inc., Gloucester City Refrigerated Warehousing, and Gloucester City Terminals.

(378) **Holt Cargo Systems, Pier 7**, is about 300 yards north of Walt Whitman Bridge on the south side of Newton Creek; 2,130 feet of berthing space with 24 to 40 feet alongside; deck height, 12 feet; two 150-ton cranes and forklift trucks with lifting capacity to 25 tons; about 250,000 square feet of covered storage and about 90 acres of open storage; receipt and shipment of general cargo; owned and operated by Holt Cargo Systems, Inc.

(379) The current velocity is about 2.1 knots off Gloucester City.

(380) **Newton Creek,** Mile 84.2E, forms the boundary between Gloucester City and Camden. Navigation is blocked 500 yards above the mouth by low fixed bridges.

(381) **Camden,** N.J., is an important manufacturing center directly opposite Philadelphia, with which its industrial and shipping activities are closely allied. The South Jersey Port Corporation, with headquarters at Camden, has jurisdiction over the New

Jersey ports bordering Delaware River and Bay from Trenton to the ocean.

(382) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(383) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(384) **Wharves.**–The Camden city waterfront extends about 3.4 miles from Newton Creek to Cooper River; also included are the petroleum terminals at Pettys Island and Fisher Point Dike. All of the wharves have highway and some have railroad connections. Camden is served by ConRail. Beckett Street and Broadway Terminals have fresh water and electrical shore-power connections. MAFCO Worldwide Corp. Pier has water connections.

(385) Cargo is generally handled by ships' tackle; special handling equipment, if available, is mentioned in the description of the particular facility. An 800-ton floating crane is available at Philadelphia by special arrangement; a 375-ton heavy lift crane is also available at Philadelphia.

(386) The alongside depths for each facility are reported. (For information on the latest depths contact the South Jersey Port Corp. or the private operator.) Only the major deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 8, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(387) **Broadway Terminal, Berth No. 5** (39°54'31"N., 75°07'24"W.): 1,100-foot face; 35 feet alongside; deck height, 12 feet; 129,000 square feet of covered storage; 30 acres of open storage; one 80-ton crane; receipt and shipment of conventional and containerized general cargo including fruit; owned by South Jersey Port Corp., and operated by Del Monte Fresh Food Inc.

(388) **Broadway Terminal, Pier No. 2** (39°54'54"N., 75°07'29"W.): 62-foot face, 1,005-foot lower side, 809-foot upper side; 35 feet alongside; deck height, 10 to 12 feet; vessel mooring and repair; owned by South Jersey Port Corp. and operated by South Jersey Port Corp. and McAllister Brothers, Inc.

(389) **Broadway Terminal, Berths 1 and 1A** (39°54'56"N., 75°07'32"W.): 443-foot face (Berth 1A), 35 feet alongside; south side (Berth 1), 856 feet long, 35 to 40 feet alongside; deck height, 11 feet; 59,600 square feet covered storage; 22 acres of open storage; one 40-ton gantry crane; receipt and shipment of conventional general cargo, coal, and petroleum coke; owned and operated by South Jersey Port Corp.

(390) **MAFCO Worldwide Corp. Pier** (39°55'09"N., 75°07'38"W.): 252-foot face, 30 feet alongside; south side, 427 feet long, 22 to 30 feet alongside; north side, 388 feet long; deck height, 12 feet; receipt of fuel oil for plant consumption; owned and operated by MAFCO Worldwide Corp.

(391) **GP Gypsum Corp. Wharf** (39°55'51"N., 75°07'57"W.): offshore wharf, 410 feet long, 30 feet alongside; deck height, 11 feet; open storage for 200,000 tons of gypsum rock; receipt of gypsum rock; owned and operated by GP Gypsum Corp.

(392) **Beckett Street Terminal Wharf** (39°56'13"N., 75°07'55"W.): 2,655-foot face, 40 feet alongside; deck height, 11 feet; 149,930 square feet of covered storage; 15 acres of open storage; cranes to 85 tons, and forklift trucks are available; receipt and shipment of general and containerized cargo and steel; receipt of lumber, ores, coal, salt, and dry bulk commodities; shipment of scrap metal; owned and operated by South Jersey Port Corporation.

(393) **Citgo Petroleum Corp., Petty's Island Terminal Dock** (39°58'14"N., 75°05'58"W.): 800 feet of berthing space; 26 feet alongside; deck height, 11 feet; 1-million barrel storage capacity for petroleum products; 165,000-barrel storage capacity for asphalt; receipt and shipment of petroleum products; receipt of asphalt; owned by Citgo Petroleum Corp., and operated by Citgo Petroleum Corp. and Koch Oil Inc.

(394) **Amerada Hess Corp., Pennsauken Dock 1 and Lower Dock** (39°58'43"N., 75°04'09"W.): 285 to 300 feet of berthing space; 39 to 40 feet alongside; deck heights, 12 to 13½ feet; 2.3-million barrel storage capacity; receipt and shipment of petroleum products; owned and operated by Amerada Hess Corp.

(395) There are no major repair facilities at Camden for large vessels.

(396) There are several shipyards at **Cooper Point,** above the Benjamin Franklin Bridge, that can make all kinds of above and below water repairs to small vessels. The largest floating drydock has a capacity of 850 tons, 182 feet long and 66½ feet wide, and has a depth of 12 feet over the keel blocks. The largest marine railway has a haul-out capacity of 750 tons.

(397) **Back Channel** between **Petty Island** and the New Jersey shore has a controlling depth of about 10 feet; both entrances are buoyed, but care is necessary to avoid the foul ground extending from both shores. The railroad-highway bridge over the northeastern end of Back Channel has a fixed span with a clearance of 15 feet. Most of the boatyards along the New Jersey shore southward of Petty Island are inactive.

(398) **Cooper River** empties into the south side of Back Channel, 0.6 mile above the southwest entrance. In June 1980, the centerline controlling depth was 6 feet to the end of the dredged channel. The channel through the flats at the entrance is buoyed. The mean range of tide is 5.9 feet in the entrance. The drawbridges over this section of the river have a minimum width of 20 feet and a clearance of 3 feet. (See **117.1 through 117.59 and 117.713,** chapter 2, for drawbridge regulations.) The petroleum wharf near the railroad bridge has a reported depth of 5 feet at its face.

(399) **Chart 12314.–**Above Philadelphia, the 40-foot dredged channel continues to Newbold Island, Mile 110, thence the project depths are 25 feet to the Trenton Marine Terminal and 12 feet to the railroad bridge at Trenton. Depths above Newbold Island may be considerably below project depths. (See Notice to Mariners and latest edition of chart for controlling depths.)

(400) The mean range of tide is 6.0 feet at Bridesburg and 6.8 feet at Trenton. Above Philadelphia the river usually is closed by ice for extended periods during January and February, and in severe winters navigation is practically suspended during these months; ice seldom forms before January.

(401) During March and April, **freshets** 10 to 20 feet in height above mean low water may be expected at Trenton. The highest level is reached during the ice breakup in the spring; heavy rains do not ordinarily raise the level to more than 9 feet above mean low water. Freshets usually are not dangerous to shipping unless accompanied by ice. The 1903 freshet, highest on record, reached heights above low water of 21½ feet at Trenton, 19½ feet at Bordentown, and 13 feet at Bristol.

(402) (See page T–6 for **Trenton Climatological table.)**

(403) The ConRail railroad bridge, which crosses Delaware River from Bridesburg, Pa., to Delair, N.J., Mile 90.6, has a vertical-lift span with a clearance of 49 feet down and 135 feet up. (See **117.1 through 117.59 and 117.904,** chapter 2, for drawbridge

regulations.) The bridgetender monitors VHF-FM channel 13; call sign KS–9970. An overhead power cable at the bridge has a clearance of 140 feet. The current velocity is 1.6 knots at the bridge.

(404) The Betsy Ross fixed highway bridge, with a clearance of 140 feet, crosses the Delaware River at Mile 90.8.

(405) The highway bridge that crosses Delaware River from Tacony, Pa., to Palmyra, N.J., Mile 93.0, has a bascule span with a clearance of 53 feet. (See **117.1 through 117.59 and 117.904,** chapter 2, for drawbridge regulations.) The bridgetender monitors VHF-FM channel 13; call sign KBA–328.

(406) Gasoline and some supplies are available at a small boatyard on the west side of the bridge at Tacony; minor engine repairs can be made.

(407) **Dredge Harbor,** Mile 96S, is a base for sand and gravel dredging equipment and yachts. The eastern entrance is closed by shoals. The western entrance has depths of about 10 feet, thence up to 15 feet inside. The sand and gravel wharves on the northeast side of the harbor have depths of 8 to 10 feet at their outer ends. Berths, gasoline, diesel fuel, and marine supplies are available at several marinas in the harbor. Hull and engine repairs can be made. Maximum haul-out capacity: lift, 30 tons.

(408) **Rancocas Creek,** Mile 96S, has some sand and gravel barge traffic as far as the first bridge; above this point the creek is used only by pleasure boats. Depths are about 5 feet to **Centerton** 6 miles above the mouth. The channel is narrow and crooked above Bridgeboro and in general follows ebb-tide bends back and forth between shoals; navigation is difficult without local knowledge. The entrance to the creek is marked by a buoy. The current velocity is about 1 knot in the entrance. There are small-craft facilities near the first bridge and at **Bridgeboro.** Berths, gasoline, and marine supplies are available. A small-craft facility at Bridgeboro can make hull and engine repairs to trailerable craft.

(409) State Route 543 highway bridge, 1.3 miles above the mouth, has a swing span with a clearance of 4 feet. The railroad bridge, 0.2 mile above the highway bridge, has a swing span with a width of 42 feet and a clearance of 3 feet. In August 2000, a replacement fixed railroad bridge with a design clearance of 20 feet was under construction close W of the existing bridge. U.S. Route 130 highway bridge at Bridgeboro, 2.6 miles above the mouth, has a fixed span with a clearance of 19 feet. The State Route 38 bridge at Centerton, 6 miles above the mouth, has a swing span with a width of 48 feet in the south opening and a clearance of 6 feet. (See **117.1 through 117.59 and 117.745,** chapter 2, for drawbridge regulations.) Above this point, navigation is limited by fixed bridges, the least clearance being 6 feet at the Mount Holly bridge, 11.5 miles above the mouth.

(410) **Poquessing Creek,** Mile 97N, forms the upper boundary of the city of Philadelphia. A yacht club at **Torresdale,** a part of the city on the lower side of the creek, has a float landing. In 1998, reported depths at the float were 9 to 12 feet.

(411) **Mud Island,** just above Poquessing Creek, is a flat which is partly submerged at high water and is covered with marsh grass in the summer. The channel between Mud Island and the Pennsylvania mainland has a controlling depth of about 7 feet. The lower part of the channel is used considerably as a small-boat anchorage.

(412) **Andalusia,** Mile 97.5N, is a suburban residential community with few industries along the waterfront. A yacht club at **Cornwells Heights,** 1 mile eastward of Andalusia, has a float landing with about 10 feet alongside; gasoline, berths, and water are available on weekends only.

(413) **Neshaminy Creek,** Mile 100N, has depths of about 7 feet to the fixed highway bridge 0.7 mile above the mouth, thence about 4 feet for another 0.3 mile to where the creek has shoaled to bare. The fixed highway bridge has a clearance of 9 feet. There are several boatyards and marinas along the creek. Berths, gasoline, diesel fuel, water, and some marine supplies are available. Hull and engine repairs can be made. Maximum haul-out capacities: railway, 60 feet; lift, 20 tons.

(414) At Mile 100.1N, a dredged channel leads to a small-craft basin at **Neshaminy State Park.** Berths, ice, water, and electricity are available. In 1974, the controlling depth was 8 feet in the entrance channel and 4 feet in the basin. In 1978, shoaling was reported in the basin in about 40°04.6'N., 74°54.4'W. The mouth of the entrance channel is marked by a light.

(415) The power cable over Delaware River at Mile 101.7 has a clearance of 140 feet. The highway bridge between Burlington N.J. and Bristol, Pa., at Mile 102.1 has a vertical-lift span with clearances of 62 feet down and 134 feet up. (See **117.1 through 117.59 and 117.904,** chapter 2, for drawbridge regulations.) The bridgetender monitors VHF-FM channel 13; call sign KBA–339.

(416) **Burlington,** Mile 102.5S, fronts in part on the main channel of Delaware River and part on the auxiliary channel southeast of Burlington Island. Several industries are located at Burlington and its suburb, **East Burlington,** which is centered a mile along the auxiliary channel.

(417) The Delaware River main channel continues along the northwest side of Burlington Island, and the auxiliary channel extends along the southeast side for 1.2 miles to a turning basin at the upper end of the U.S. Pipe and Foundry Co. In September 1996, the midchannel controlling depth in the auxiliary channel was 10 feet, thence in 1982, depths of 10 to 17 feet were in the basin. Eastward of the turning basin, the back channel has natural depths of about 6 to 11 feet through the northeast entrance.

(418) The overhead power cable about 0.3 mile northeast of the turning basin has a clearance of 45 feet.

(419) The current velocity is 1.3 knots on the flood and 1.6 knots on the ebb in the main channel west of Burlington Island. In the back channel east of the island, the velocity is 0.9 knot on the flood and 1.8 knots on the ebb.

(420) The public utilities wharf at the lower end of Burlington has reported depths of 20 feet at the face; other wharves have depths ranging from 7 to 12 feet. The town wharf, about 0.4 mile east of Assiscunk Creek, has depths of 12 feet reported alongside. An oil wharf, above the turning basin, has depths of about 12 feet at the outer face. A marina at the entrance to **Assiscunk Creek** has berths, gasoline, diesel fuel, ice, and some marine supplies. A 7-ton mobile hoist is available for hauling out vessels for hull and engine repairs.

(421) **Bristol,** Mile 103.5N, was the terminus of the **Delaware and Lehigh Canal,** which was abandoned in 1931; the former Bristol entrance from the river is filled in. The public wharf at the lower end of the town has depths of about 3½ feet reported at the face. A yacht club near the upper end of Bristol has float landings with 8 feet reported alongside; water is available; members or guests may use the club railway to haul out boats up to 38 feet, but must make their own repairs.

(422) At Mile 104.5S, Gold Bond Building Products operates a wharf which provides 420 feet of berthing space. Depths of 31 feet are reported alongside; deck height, 9 feet. There is an

electrical shore power connection. There is a conveyor system for unloading gypsum rock and railroad and highway connections.

(423) The fixed highway bridge at Mile 105.1 has a clearance of 135 feet.

(424) At about Mile 105.9N, an oil company operates a wharf which has 875 feet of berthing space with dolphins. A depth of 37 feet is alongside; deck height, 15 feet. There are highway connections near the wharf. The facility is used for receipt of petroleum products.

(425) **Florence,** Mile 107W, is a manufacturing community with no waterborne commerce.

(426) **Roebling,** at Mile 108S, has a steel mill and furnace plant. The main wharf is 300 feet long and has depths of about 12 feet reported alongside, deck height, 8 feet. The plant has railroad and highway connections.

(427) **Newbold Island,** just above the Roebling main wharf, is 1.5 miles long, with a greatest width of 0.7 mile. The main channel of Delaware River is along the north side of Newbold Island.

(428) In September 1982, a section of the back channel, S of Newbold Island, between the island and the New Jersey mainland was reported to have shoaled to bare.

(429) At Mile 109N is a basin where sand and gravel are handled. The wharves have depths of about 10 feet at their faces.

(430) **Fieldsboro,** Mile 110.5S, is a residential community with no waterborne commerce.

(431) The current velocity in Whitehill Range off Fieldsboro is 1.4 knots on the ebb; the flood current is weak and of short duration.

(432) **Crosswicks Creek,** Mile 111.1S, is used extensively by pleasure craft. Berths and gasoline can be obtained at one of the yacht clubs at Bordentown, near the mouth of the creek. In September 1992, a fixed highway bridge (I-295) was under construction across Crosswicks Creek, mile 0.0, with a design clearance of 35 feet.

(433) **Bordentown,** on the high bank on the southeast side of the entrance to Crosswicks Creek, was the terminus of the **Delaware and Raritan Canal,** which was abandoned in 1933.

(434) Mariners are advised to stay in the dredged channel when navigating between Bordentown and Trenton, because of the rocky ledges and shoals bordering the channel.

(435) On **Duck Island,** Mile 113E, there are two oil-receiving piers with 16 feet reported alongside, and a public utility coal pier with 25 feet reported alongside. Vessels stay in the main channel until north of the coal pier before heading toward shore and southward to the oil terminals to avoid the shoal area between the main channel and the terminals.

(436) On the New Jersey shore between Duck Island and Trenton are small-craft facilities where gasoline, berths, water, and some marine supplies are available. Minor hull and engine repairs can be made.

(437) A power cable with a clearance of 166 feet crosses the Delaware River at Mile 114.

(438) **Trenton,** the capital of New Jersey, is at the railroad bridge crossing the river at Mile 116. The railroad bridge is the head of powerboat navigation. The city is an important manufacturing center.

(439) Just below the railroad bridge, there is an oil-receiving wharf with depths of 10 to 15 feet alongside.

(440) **Weather.**–Trenton is in a region about midway between the rigorous climates of the North and the mild climates of the South and located at on the Delaware River, upstream from Philadelphia.

(441) Rainfall distribution throughout the year is rather uniform with the spread between the wettest month (July) and the driest month (February) being only 1.82 inches (46.2 mm). The average annual precipitation for Trenton is 41.97 inches (1066 mm). The greatest 24-hour rainfall occurred in July 1975 when 5.75 inches (146 mm) fell.

(442) Snowfall occurs on about 20 days per year on the average; however, an average of only 6 days annually produce snowfalls greater than 1.5 inches (38.1 mm). The average annual snowfall is 24.7 inches (627.4 mm). February is the snowiest month but it is trailed closely by January. The greatest 24-hour snowfall occurred in February 1978 when 13.4 inches (340.4 mm) fell.

(443) In summer, the area is under the influence of the large semipermanent high-pressure system commonly known as the Bermuda High. Based on climatology, it is usually centered over the Atlantic Ocean near latitude 30°N. This high-pressure system brings a circulation of warm, humid air masses over the area from the deep South. The proximity of large water areas and the inflow of southerly winds contribute to high relative humidities much of the year.

(444) January is the coldest month, and July, the warmest. The average annual temperature at Trenton is 54.3°F (12.4°C) with an average high of 62.2°F (16.8°C) and an average low of 45.9°F (7.7°C). The warmest temperature on recorded at Trenton is 102°F (38.9°C) last recorded in July 1966. The coldest temperature on record is -4°F (-20°C) last record in January 1978. Each month, October through April, has recorded temperatures below freezing (0°C) while only July has seen temperatures in excess of 100°F (37.8°C).